DataSite Electronic Flow Meter and Remote Terminal Unit

Allen-Bradley

Catalog Numbers 1758-FLO301, 1758-FLO302, 1758-RTU201, 1758-RTU202
Software User Manual FRN 1.30









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Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://literature.rockwellautomation.com) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING 	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION 	Identifies information about practices or circumstances that can lead to: personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
SHOCK HAZARD 	Labels may be on or inside the equipment, such as a drive or motor, to alert people that dangerous voltage may be present.
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Read this preface to familiarize yourself with the rest of the manual. It provides information concerning:

- who should use this manual
- the purpose of this manual
- related documentation
- conventions used in this manual

Who Should Use this Manual

Use this manual if you are responsible for designing, installing, programming, or troubleshooting control systems that use DataSite controllers.

You should have a basic understanding of electrical circuitry and familiarity with relay logic. If you do not, obtain the proper training before using this product.

Purpose of this Manual

This manual is a reference guide for the software tools that accompany the DataSite controller, namely DS Settings, DS FloConfig, and DS DNP3. These tools can be used to configure and monitor the DataSite controller. This manual describes the procedures you use to install and use the tools.

Related Documentation

The publications listed in this table contain more information on the DataSite controllers.

Related publications for DataSite controllers

Pub. Title	Pub. Number	Description
DataSite Electronic Flow Meter and Remote Terminal Unit Installation Instructions	1758-IN001	Information on how to install a DataSite controller.
DataSite Electronic Flow Meter and Remote Terminal Unit Hardware User Manual	1758-UM001	Information on how to install and wire a DataSite controller.
Customized Function Blocks for DataSite Reference Manual	1758-RM001	Description of the customized function blocks used for programming DataSite controllers using the DataSite Workbench software.
DataSite Screen Builder user documentation available on the DataSite CD and from http://www.isagraf.com	—	Information on using the DataSite Screen Builder to create graphical user interfaces.
DataSite Workbench user documentation available on the DataSite CD and from http://www.isagraf.com	—	Information on using the DataSite Workbench to develop multi-process control projects for use with DataSite controllers.
Modbus Protocol Specifications available from www.modbus.org	—	Information about the Modbus protocol.
Allen-Bradley Programmable Controller Grounding and Wiring Guidelines	1770-4.1	In-depth information on grounding and wiring Allen-Bradley programmable controllers.
Application Considerations for Solid-State Controls	SGI-1.1	A description of important differences between solid-state programmable controller products and hard-wired electromechanical devices.

Related publications for DataSite controllers (Continued)

Pub. Title	Pub. Number	Description
National Electrical Code - Published by the National Fire Protection Association of Boston, MA.	—	An article on wire sizes and types for grounding electrical equipment.
Allen-Bradley Publication Index SD499	—	A complete listing of current documentation, including ordering instructions. Also indicates whether the documents are available on CD-ROM or in multi-languages.
Allen-Bradley Industrial Automation Glossary	AG-7.1	A glossary of industrial automation terms and abbreviations.

Common Techniques Used in this Manual

The following conventions are used throughout this manual:

- Bulleted lists such as this one provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.
- *Italic* type is used for emphasis.

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DataSite Configuration Settings Utility (DS Settings)

This chapter provides information on the configuration settings utility, DS Settings.

IMPORTANT Use this tool to configure the 1758-RTU DataSite controllers only.

Introduction

DS Settings is a configuration software for 1758-RTU DataSite controllers. DS Settings provides the following functions:

- PC Communication Settings

  This function lets you set up the communication mode and parameters for the DataSite controller to be connected to the PC via the serial port or the Ethernet (TCP/IP) port.

- Controller Communication Settings

  This function lets you set up the controller parameters, such as serial port parameters or Ethernet parameters, and low-power settings.

- Scan Settings

  This function lets you configure Modbus master serial messages to Modbus slave devices.

- Event Settings

  This function lets you configure four types of real-time clock (RTC) interruption events, namely system events, alarm events, calendar events and time events.

- Controller Debug

  This function lets you use test registers and retrieve data from the DataSite controller for online or offline debugging of the user programs you have written for the controller in DataSite Workbench.

- Controller Initialize

This function lets you initialize the DataSite controller back to factory defaults.

- HART Settings

  This function lets you configure and send HART commands.

Hardware and Software Requirements

To install DS Settings, you need the following:

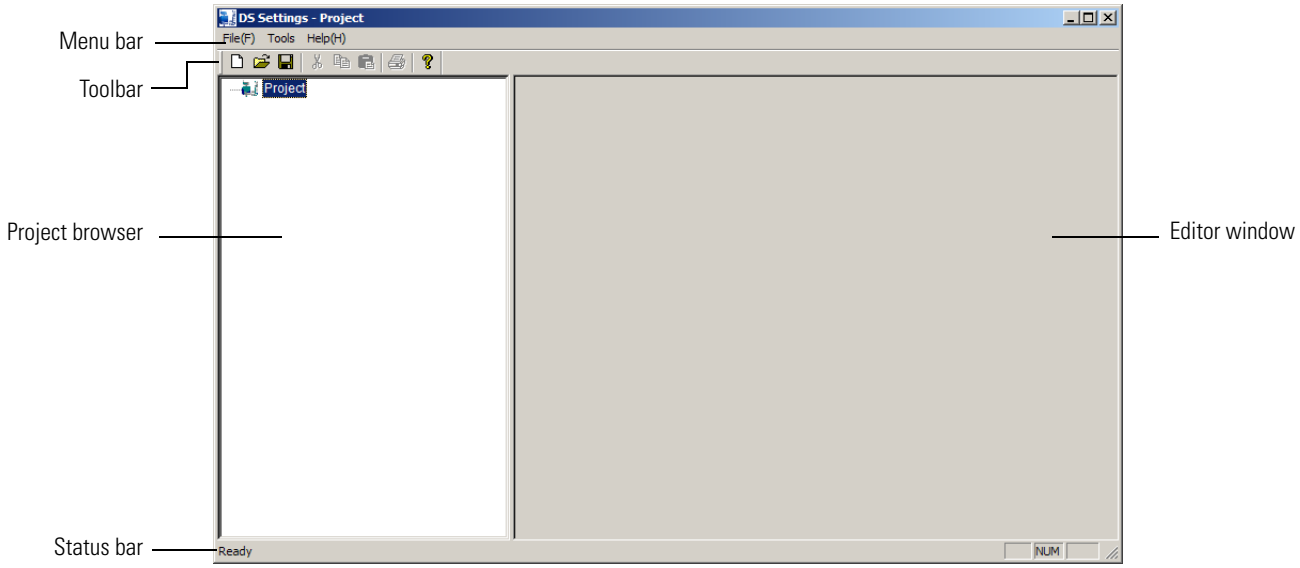
- an IBM-compatible PC with at least a 80486 microprocessor (Pentium-166 and above),
- a CD-ROM drive,
- at least 70 MB of free hard disk space,
- at least 32 MB of memory (64 MB recommended),
- a VGA graphic card, and
- Windows NT 4.0, Windows 2000, or Windows XP Professional.

Start DS Settings

Follow these steps to start DS Settings.

1. Start Microsoft Windows.
2. Click Start > Programs > Rockwell Software > DataSite Products > DataSite Tools > DS Settings.

   The DS Settings window appears. The default project file name is Project.



Create a New Project

Follow these steps to create a new project.

1. From the File menu, choose New Project.

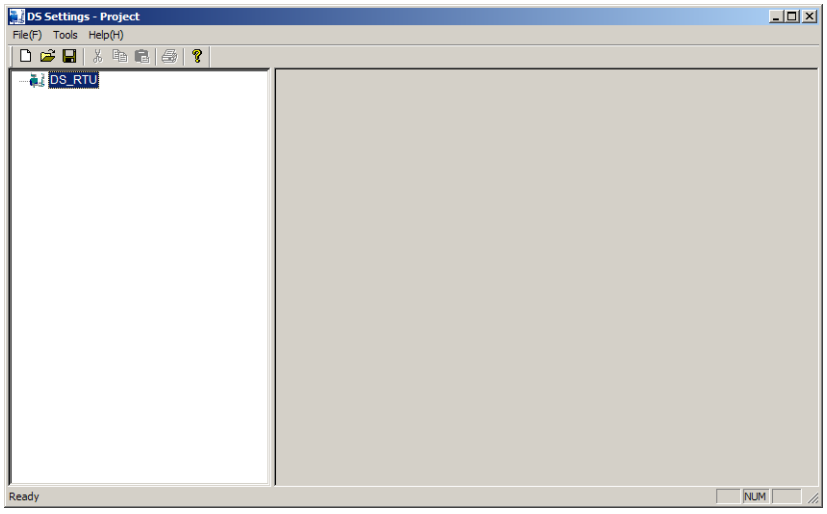
   The New Project dialog box appears.

2. Enter the project name, for example, DS_RTU.prj.

3. Click OK.

   The new project file, DS_RTU.prj in this example, is created in C:\Program Files\Rockwell Automation\DS Settings\DS Settings Project.

   The file is opened in the project browser.



Save a Project

Follow this step to save a project using its current file name.

- From the File menu, choose Save.

  The project file, DS_RTU.prj is saved in the current location. In this example, it is C:\Program Files\Rockwell Automation\DS Settings\DS Settings Project.

Follow these steps to save the project into a different file.

1. From the File menu, choose Save As.

The Save As dialog box appears.

2. Browse to the location you want to store the project file in and enter the new file name.

3. Click Save.

Open a Project

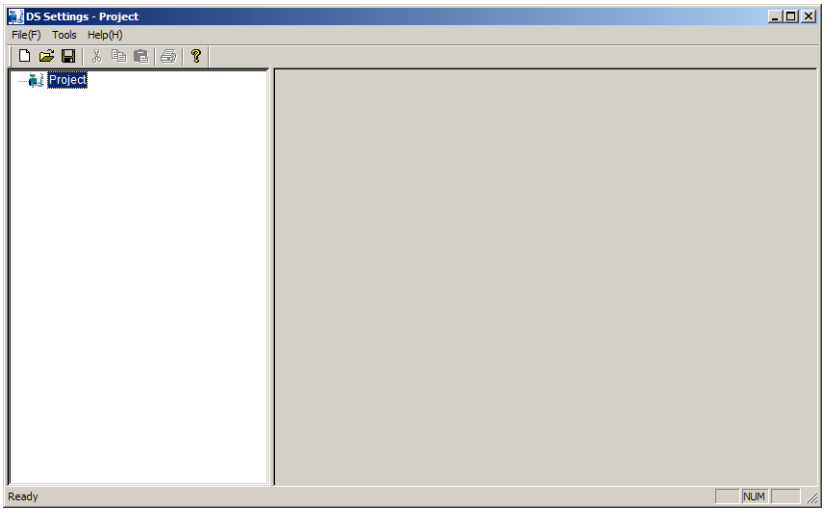
Follow these steps to open a project.

1. From the File menu, choose Open.

2. Browse to the location of the project file you want.

3. Select the project file and click the Open button.

   The DS Settings window appears.



Close DS Settings

Follow this step to close DS Settings.

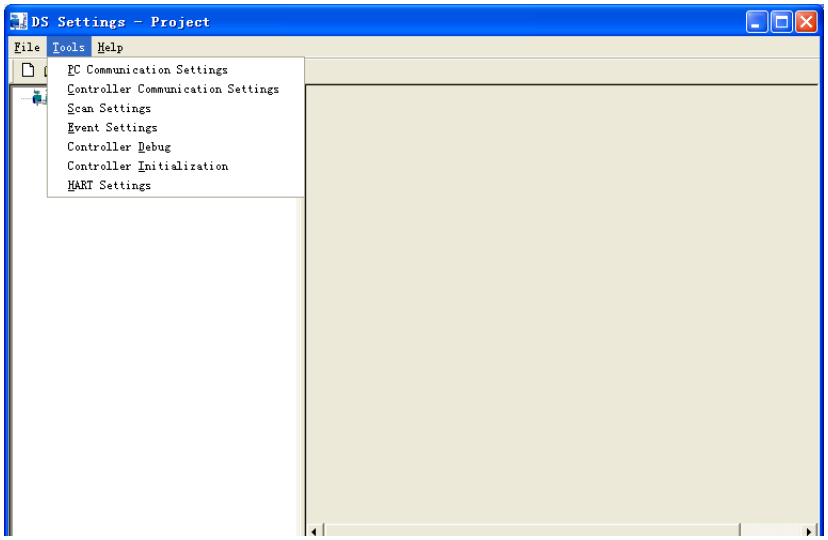
- From the File menu, choose Exit.

Configure PC Communication Settings

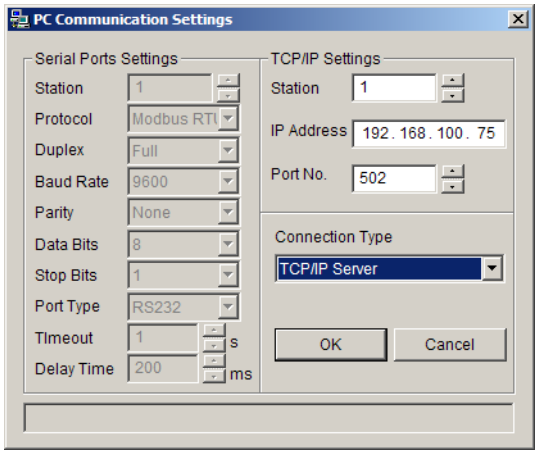
The DataSite controller can be connected to the PC via the serial port or the Ethernet (TCP/IP) port. Use PC Communication Settings to set up the communication mode and parameters for this connection.

Follow these steps to configure PC Communication settings:

1. From the Tools menu, choose PC Communication Settings.

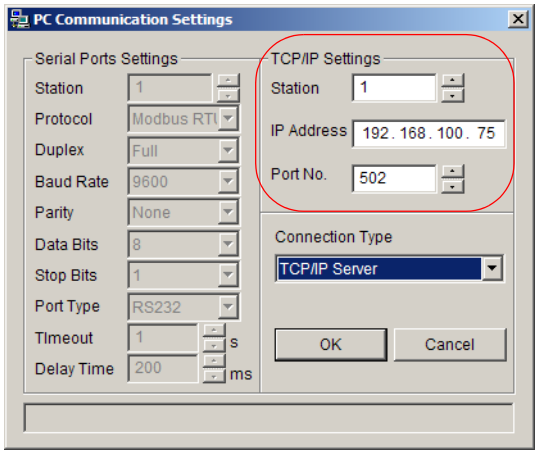


The PC Communication Settings dialog box appears.



2. From the Connection Type pull-down menu, choose the type of communication port used between the PC and the DataSite controller:
   - For Ethernet communication mode, choose TCP/IP Server.
   - For Serial port communication mode, choose your PC's COM port from one of the COM ports (COM1…COM10).

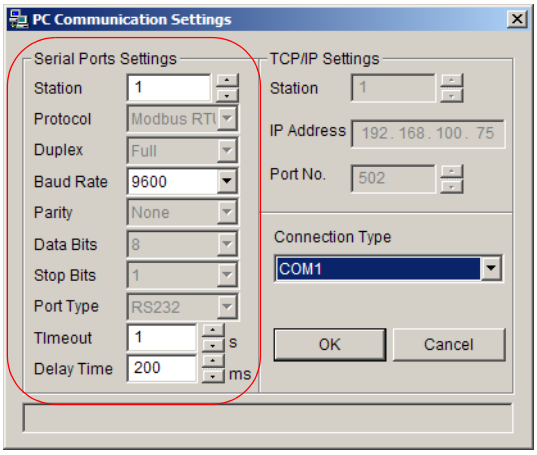
3. If you have chosen TCP/IP Server, set up the parameters for the TCP/IP connection.



Parameters for TCP/IP Communication

Parameter	Description	Default Value
Station number	Station corresponding to the DataSite controller communication Ethernet port.	1
IP address	IP address corresponding to the Ethernet communication port of the DataSite controller. The address is in the format, xxx.xxx.xxx.xxx, made up of four octets with each octet ranging between 0 and 255.	192.168.100.75
Port no.	Port corresponding to the DataSite controller.	502

4. If you have chosen a COM port, set up the parameters for the serial port connection.



Parameters for Serial Port Communication

Parameter	Value range
Station number	1…247
Baud rate (bps)	2400, 4800, 9600, 14400, 19200, 38400, 56000, 57600
Timeout (1 s)	1…10
Delay time (1 ms)	0…3000

5. To confirm the PC settings and close the window, click OK.
To cancel the configuration and close the window, click Cancel.

TIP When you click OK, the system will automatically save the PC settings into a default file. The file name is PC Communication Parameter.cfg, located in the current project directory.

Configure Controller Communication Settings

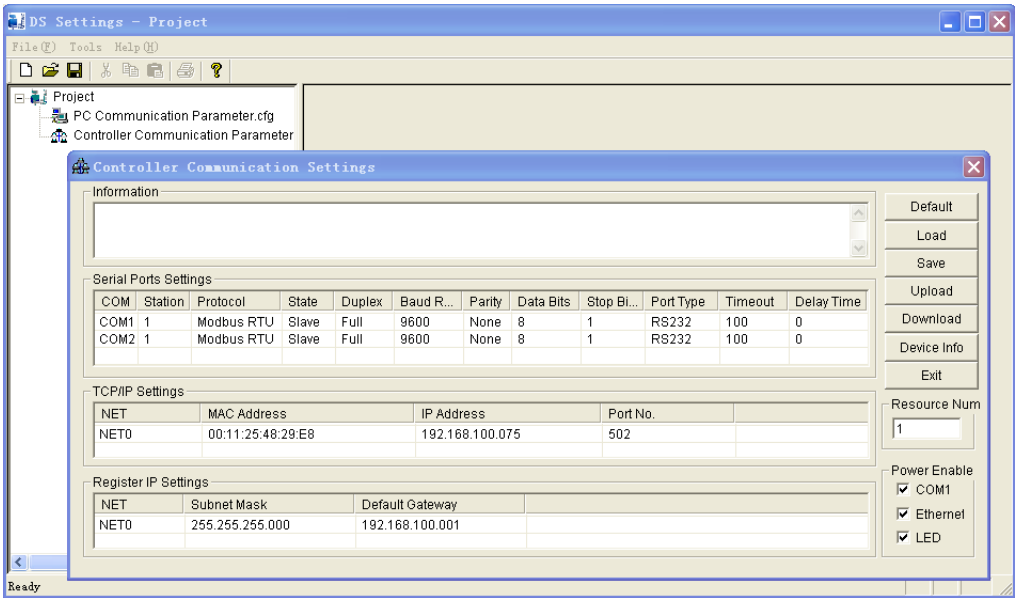
Use Controller Communication settings to set controller parameters, such as serial port parameters or Ethernet parameters, and low-power settings.

Follow this step to open the Controller Communication Settings dialog box.

- From the Tools menu, choose Controller Communication Settings.

  The Controller Communication Settings dialog box appears. The file, Controller Communication Parameter.esy, located in the current project directory, is displayed in the project browser file pane.

TIP You can also double-click the Controller Communication Parameter.esy file in the project browser file pane to open the PC Communication Settings picture.



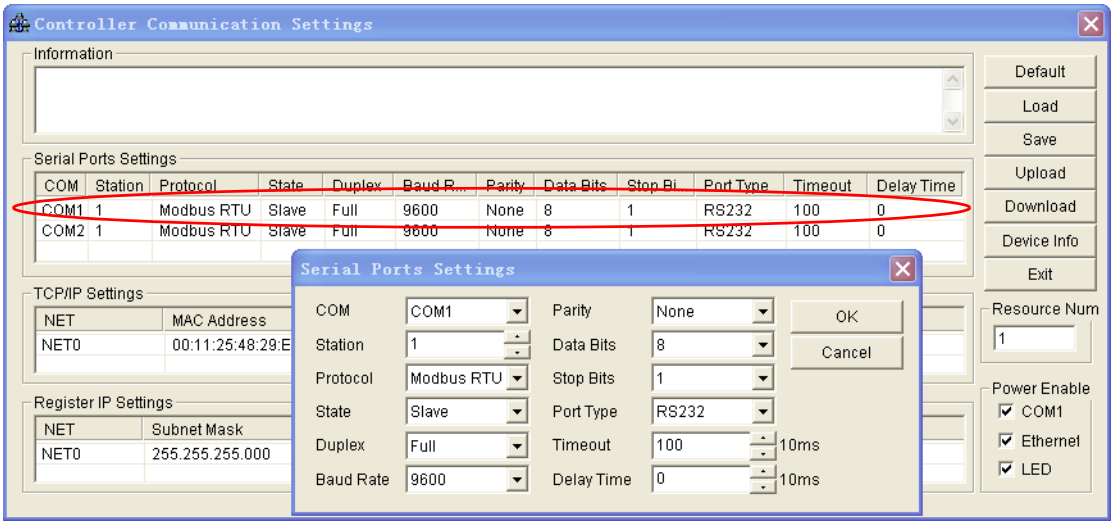
The Information box displays a status message after each software operation. For example, if a file is loaded successfully, the message, "Load from file successful" appears in the Information box.

Configure Serial Port Settings

Follow these steps to configure the serial port.

1. In the Serial Ports Settings box, double-click the row for the serial port you want to configure.

   The Serial Ports Settings dialog box appears.



2. Set up the parameters of the selected serial port.

TIP You can also select another serial port from the COM pull-down menu, and set up the parameters for that port.

This table shows the options and/or value range available for each parameter.

Serial port parameters

Parameter	Parameter Options or Value Range
COM	COM1, COM2
Station	1…247
Protocol	Modbus RTU, Modbus ASC, DS Workbench (only for COM2), None
Master/Slave state	Master, Slave
Duplex	Full, Half
Baud rate	2400, 4800, 9600, 14400, 19200, 38400, 56000, 57600
Parity	Even, Odd, None
Data bits	7, 8
Stop bits	1, 2
Port type	RS232, RS485
Timeout (in units of 10 ms)	1…1000
Delay time (in units of 10 ms)	0…300

3. To save the settings and close the Serial Ports Settings dialog box, click OK.
   To close the dialog box without saving the settings, click Cancel.

4. Click Download.

   The new settings are applied to the DataSite controller.

The following sections provide more information on some of the parameters for the serial port.

Protocol

When customizing the communication protocol, it is recommended that you set the protocol as "None". You can then use flags in DataSite Workbench to program the customized communication protocol. The flags corresponding to each serial port are shown in the following table:

Flags in DataSite Workbench for serial ports

Flag	Description
US1_RX	US1 receiving task for US1 customized protocol
US2_RX	US2 receiving task for US2 customized protocol

Master/Slave State

The serial port scan block can be configured in the master state to acquire data from the slave serial communication equipment connected in a certain time interval. In the slave state, the DataSite controller can receive commands from the host, generate and return response message. For more information, see the Configuration Example on page 50.

TIP Verify the protocol setting. If you set the protocol as "None", the scan and the trigger scan function blocks will not run properly even if the Master/Slave state is set correctly.

Timeout

In the master state, timeout is the maximum length of waiting time after a command is sent. No new commands are sent while waiting for a response. If no response is received after timeout, an error message box will be displayed to inform you. You will then be prompted to send a new command.

Timeout is not applicable in other states.

Delay Time

In the master state, delay time is the maximum length of waiting time for the next send command after one send/receive cycle is completed. This setting can help prevent communication errors caused by a slower response of the slave communication equipment connected.

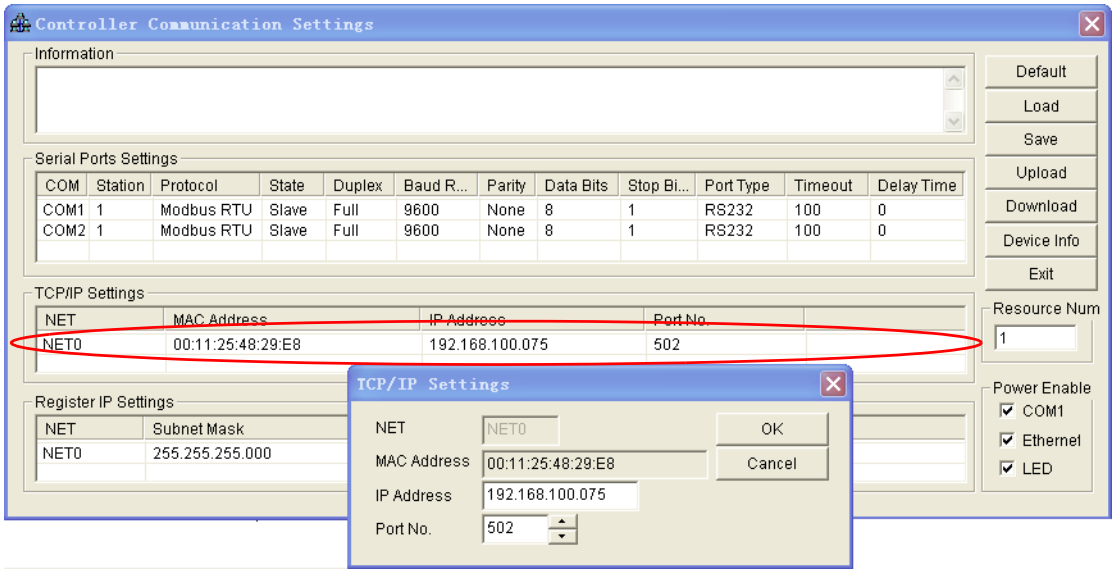
In the slave state, delay time is the maximum length of waiting time for a response to be returned after a command is received. This setting can help prevent communication errors caused by a slower response of the master communication equipment.

Configure TCP/IP Settings

Follow these steps to configure the Ethernet port.

1. In the TCP/IP Settings box, double-click the row for the TCP/IP port you want to configure.

   The TCP/IP Settings dialog box appears.



2. Set up the parameters of the selected TCP/IP port.

   This table shows the value range for each parameters.

TCP/IP port parameters

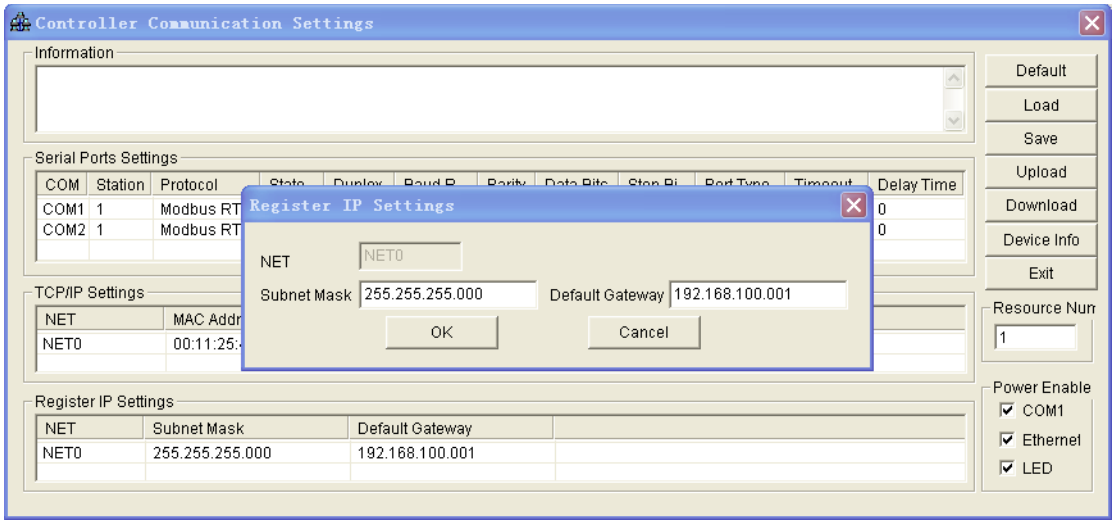
Parameter	Parameter Value Range
NET (Ethernet card)	NET0
MAC address	xx:xx:xx:xx:xx:xx 6 integers in hexadecimal format. For example, 00:00:BC:60:61:D0. The MAC address is read-only.
IP address	xxx.xxx.xxx.xxx 4 octets with each octet ranging from 0…255.
Port no.	502 The port number of DS Settings TCP/IP port is defined as 502 when the PC is connected to the DataSite controller.

TIP If you change the IP address, the DataSite controller will cycle power automatically.

3. To save the settings and close the TCP/IP Settings dialog box, click OK. To close the dialog box without saving the settings, click Cancel.

Register IP Settings

The subnet mask and default gateway settings allow you to determine the DataSite controllers that you want to establish communication with in the network. This allows you to manage your network more efficiently.



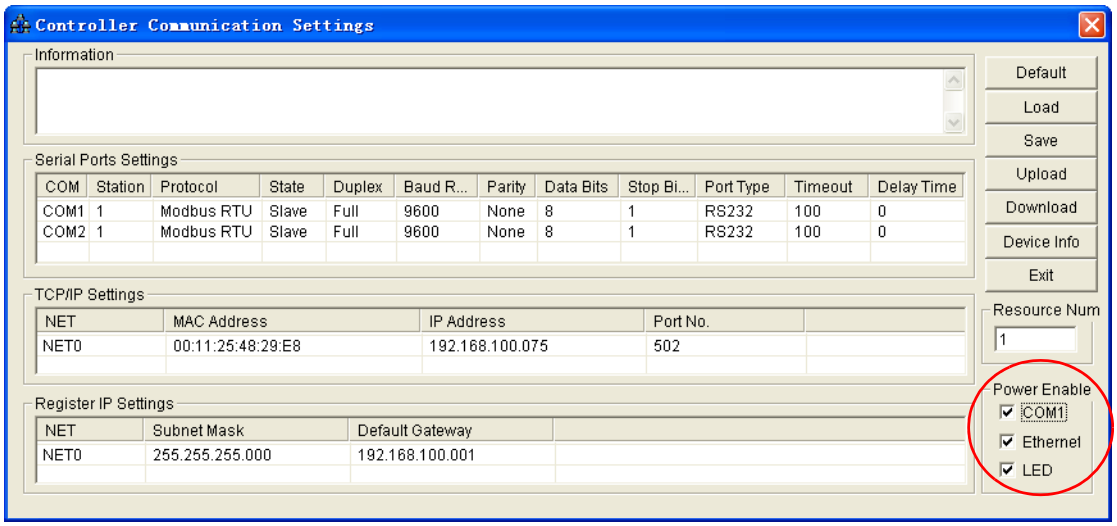
Lower the Power Consumption

The options in the Power Enable group allow you to shut the power supply to some parts of the DataSite controller to lower power consumption.

Follow these steps to lower power consumption.

1. Under Power Enable in the Controller Communication Settings dialog box, clear the check boxes for the parts that can go to sleep:

   - COM1 port
   - Ethernet port
   - LED indicators



IMPORTANT If you are still using a port, do not clear its check box under Power Enable. Otherwise, communication may be interrupted. For example, when the DataSite controller is communicating via the Ethernet port, do not shut the power supply of the Ethernet port.

2. Click Download.

   The settings are applied to the DataSite controller.

Display the Default Settings

Follow this step to display default values.

- Click Default.

  The message, "Default settings enabled." appears in the Information box.

Serial Port Settings (Factory Default)

Parameter Name	Parameter Value
Station	1
Master/Slave state	Slave
Duplex	Full
Baud rate (bps)	9600
Parity	None
Data bits	8
Stop bits	1
Port type	RS232
Timeout (10ms)	100
Delay time (10 ms)	0

Ethernet Port Settings (Factory Default)

Parameter Name	Parameter Value
Ethernet card	NET0
IP address	192.168.100.075
Basic port no.	502

Registration IP Address (Factory Default)

Parameter Name	Parameter Value
Subnet mask	255.255.255.0
Default gateway	192.168.100.001

Power Enable Settings (Factory Default)

Parameter Name	Parameter Value
COM1 (On-Off)	Enable
LED (On-Off)	Enable
Ethernet (On-Off)	Enable

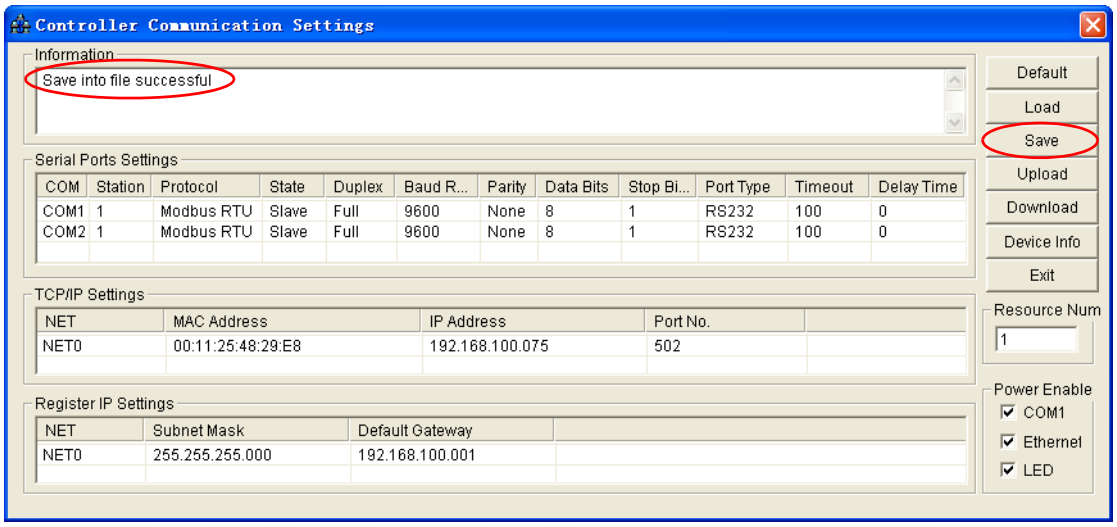
Save the Controller Communication Settings

Follow this step to save the settings you have made.

- Click Save.

  The controller parameter configuration is saved into the file, Controller Communication Parameter.esy.

  If the file is saved successfully, the message "Save into file successful" will appear in the Information box.



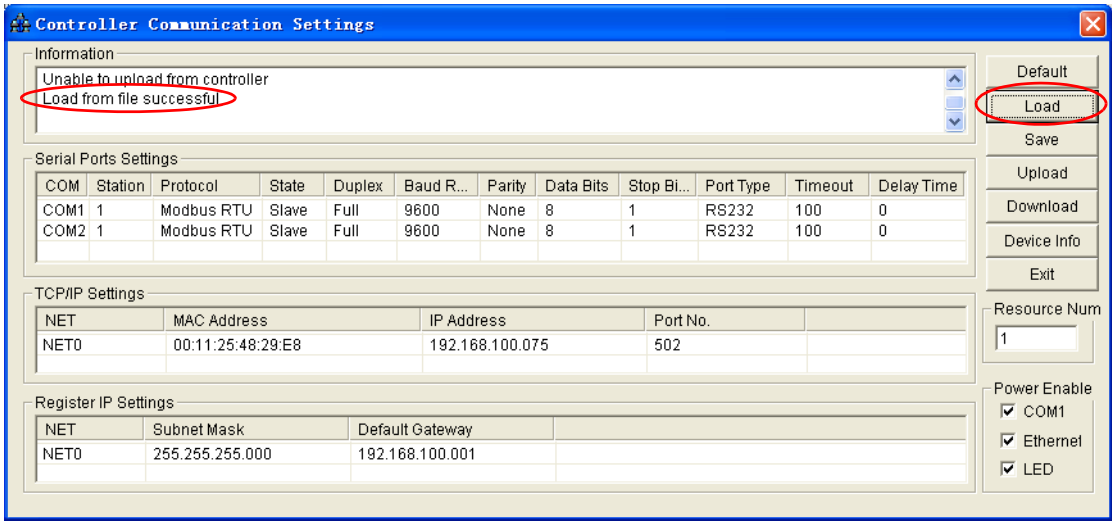
Load the Controller Communication Settings

Follow this step to load the settings. This will load the last saved configuration of the DataSite controller parameters.

- Click Load.

  Alternatively, you may double-click the file, Controller Communication Parameter.esy, from the file pane of the project browser or choose Controller Communication Settings from the Tools menu.

  If the file is loaded successfully, the message "Load from file successful" will appear in the Information box.

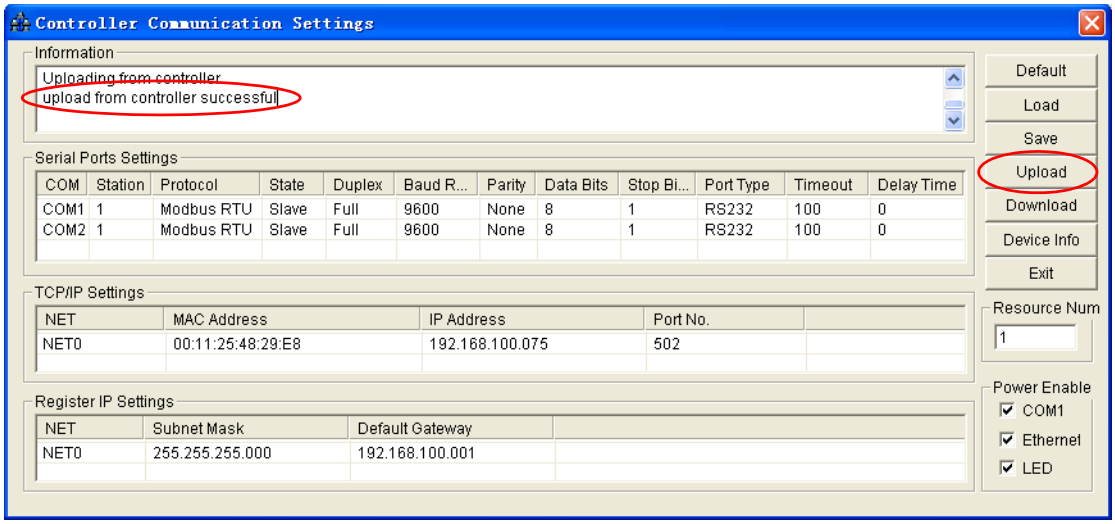


Upload the Controller Communication Settings from the Controller

Follow this step to upload (read) the controller parameter settings from the controller.

- Click Upload.

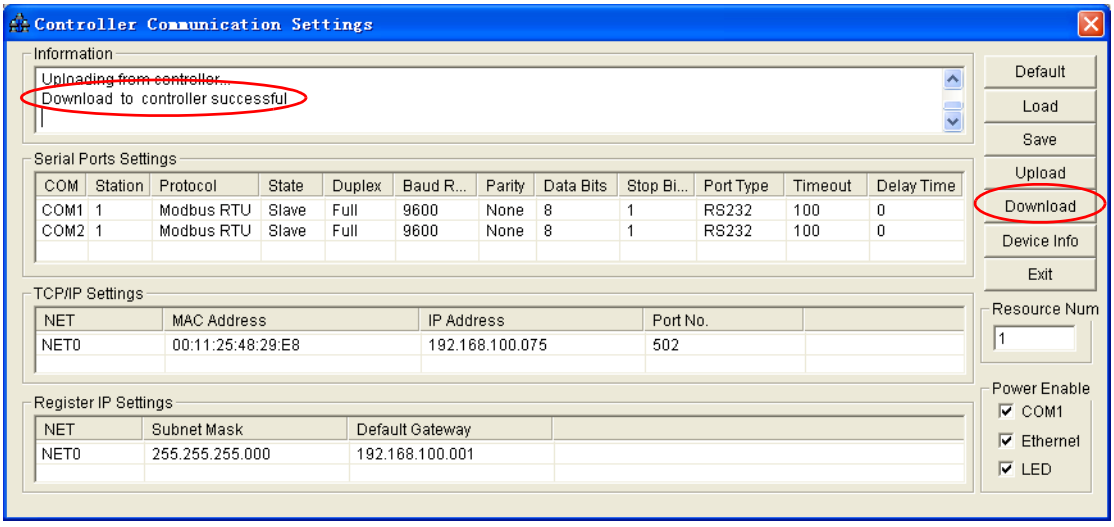
  If the settings are uploaded successfully, the message "Upload from controller successful" will appear in the Information box.



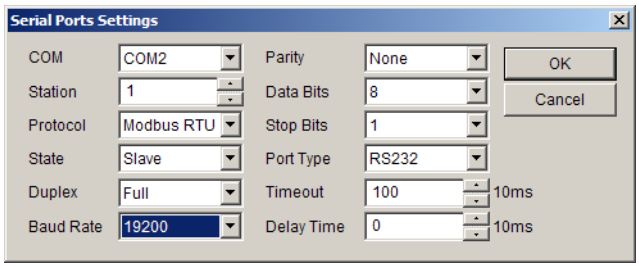
Download the Controller Communication Settings to the Controller

Follow these steps to download (write) the controller parameter settings to the controller.

1. Set up system parameters.
2. Click Download.



IMPORTANT When connecting via a certain serial port of the controller, see COM2 as shown.

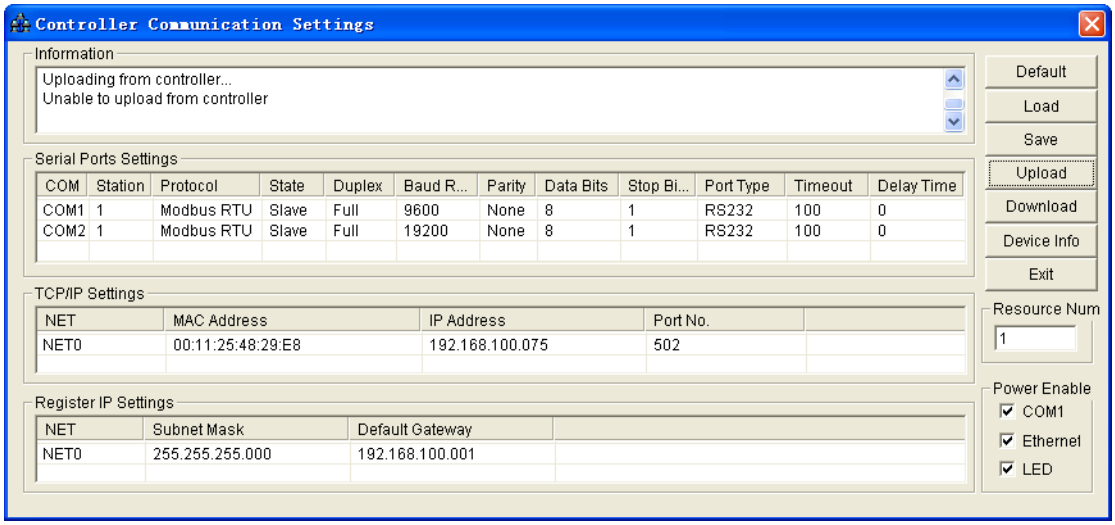


3. Change the baud rate of COM2 to 19200, and then click Download.

   The message "Download to controller successful" appears.

4. Click Upload.

The message "Unable to upload from controller" appears.

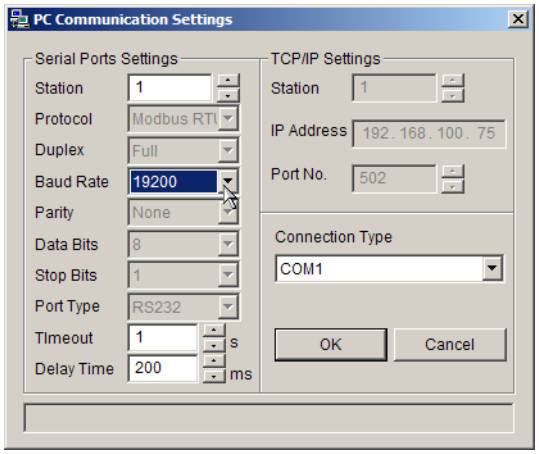


This indicates that the COM2 baud rate of the controller has been changed to 19200.

5. Click Exit to close the Controller Communication Settings dialog box.

6. Open the PC Communication Settings dialog box.

7. Change the baud rate of the serial port on the PC to 19200.



8. Click OK.

The PC Communication Settings dialog box is closed.

9. Open the Controller Communication Settings dialog box again.

10. Click Upload to upload the controller communication settings again.

    The message "Upload from controller successful" appears.

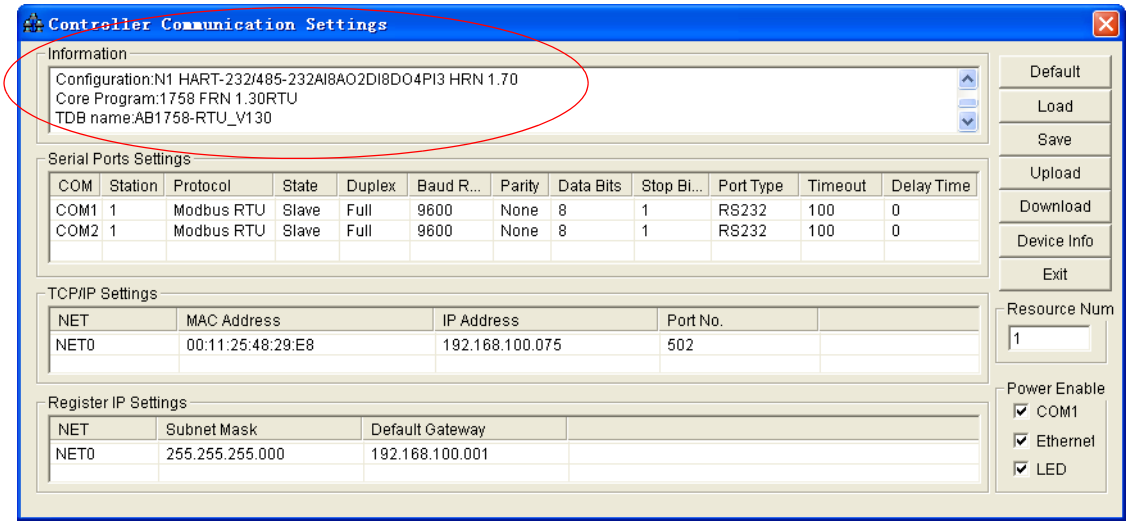
You may encounter a similar scenario when you connect to the Ethernet port of the controller and change its setting, such as the IP address.

Display the Device Information

Follow this step to display the device information of the DataSite controller.

- Click Device Info.

  The device information of the DataSite controller appears in the Information box.



Close the Controller Communication Settings dialog box

Follow this step to close the Controller Communications Settings dialog box.

- Click Exit.

Settings

For integrated modules such as the DataSite controller, the master ports can directly read/write parameters by accessing the fixed Modbus registers. We need to set scan blocks of US1 and US2 only when we want to access other pieces of equipment connected with the two serial ports (COM1, COM2).

Use Scan Settings to match the register addresses of the 1758 controller with those of the serially connected equipment.

TIP A custom function block that can be triggered in the user program to provide Modbus Master read/write functions is also available. For more information, see the DataSite Customized Function Blocks Reference Manual, 1758-RM001 .

Understand the Scan Blocks

Every scan block corresponds to a scan task. The maximum number of scan tasks is 128. This table lists the description of each item in a scan block.

Scan block parameters and their descriptions

Scan Block Parameter	Description
Block type	Scan block data category
Module Addr	Modbus slave station number of serial communication equipment connected with COM1 or COM2.
Signal type	Signal register category
Scan time	Read/Write interval
Master Register	Register address where data is saved in the controller, decided by the user.
Slave Register	You can set the read/write data register address of the slave communication equipment according to the parameter form of the slave communication equipment register.
Reg_Num	The number of read/write data registers.
Err_Cnt	The number of times the scan block fails to communicate.
Err_State	Scan block communication state. If the Err_State value is 1, it means the communication has failed. A value of 0 indicates that the communication is OK.
Remark	User comments. You can enter a note or a tip for the scan block. Note that this field will not be downloaded to the DataSite controller.

Block Type

The block type indicates the category of scan block data.

Scan block types and their descriptions

Name	Function
US1 block	1758-RTU controller Read-write data of the serial equipment connected with the serial port COM1.
US2 block	1758-RTU controller Read-write data of the serial equipment connected with the serial port COM2.
Empty block	Scan block configuration end flag

Scan blocks are configured in sequence, and every block has a corresponding number. The maximum number of block numbers is 128.

When the type of a block is Empty Block, its subsequent block configuration is invalid.

Module Addr

For 1758-RTU controller, this means the Modbus slave station number of the serial communication equipment connected with COM1 or COM2.

The range of the Modbus slave station number is 1…247.

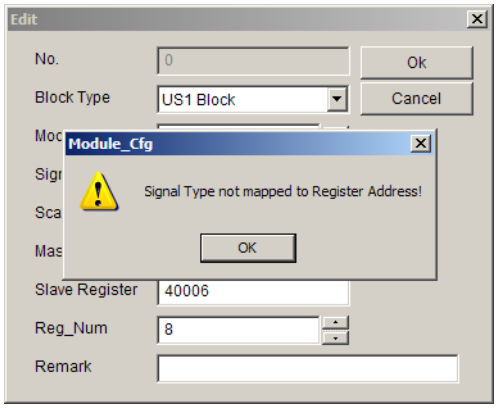
Signal Type

The signal type indicates the category of register read/write signal, and its contents.

Signal types and functions

Signal Type	Function	Modbus Command
Read_Coil register	Read 00001…04096 register	1
Read_State register	Read 10001…14096 register	2
Read_Hold register	Read 40001…49999 register	3
Read_Input register	Read 30001…31024 register	4
Write_1Coil register	Write 00001…04096 register	5
Write_1Hold register	Write 40001…49999 register	6
Write_nCoil register	Write 00001…04096 register	15
Write_nHold register	Write 40001…49999 register	16

When the address of the master or slave register does not map to the signal, the following error will appear.



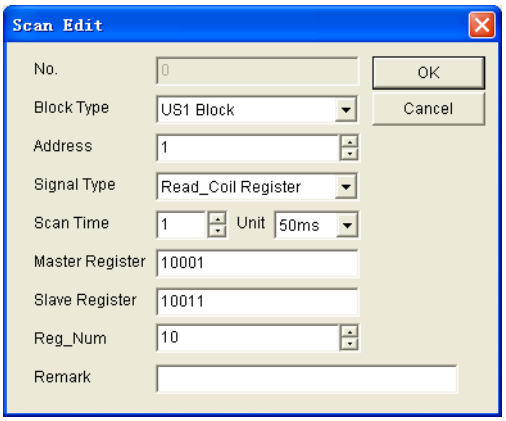
Scan Time

Scan time refers to the read-write time interval of a scan block. You can use the trigger scan function for COM port by programming the function block COM_MSG in DataSite Workbench.

The following units of time are available. Note that ms represents milliseconds, s seconds, m minutes, and h hours:

- 50 ms
- 500 ms
- 5 s
- 50 s
- 5 m
- 50 m
- 5 h
- 50 h

The scan time is equal to the value multiplied by the unit selected. For example, if the value entered is "3" and the unit selected is "500 ms", then the scan time is 3 x 500 ms = 1500 ms as shown in the following dialog box. This means that the current scan block will be executed every 1500 ms.



Scanning starts when the DataSite controller is powered, and it continues according to the scan time you have set.

Master Register

This is the start address of the register on the DataSite controller. Data is saved into the master register starting from this address. The address range is determined by the signal type.

Slave Register

This is the start address of the register on the slave equipment for reading data from and writing data to. The controller will read data from or write data to the slave equipment from this address. The address range is determined by the signal type.

Reg_Num

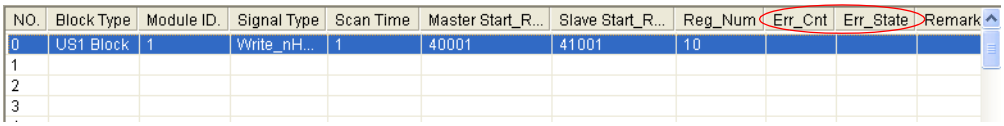
The number of read/write data registers that follow the start register address of the master register and the slave register. For example, if Reg_Num is 10, the Master Start_Register is 40001 and the Slave Start_Register is 41001, this means there are 10 master registers with register addresses running sequentially from 40001…40010, and 10 slave registers with register addresses 41001…41010.

Remark

This field lets you enter a note or a tip for the scan block. This information can be saved onto the PC but unlike other parameters, it will not be downloaded to the DataSite controller. The maximum string length for this field is 90 characters.

Err_Cnt and Err_State

These two parameters do not require user configuration. If you set up a scan block successfully, two columns for these parameters will be added in the scan block list automatically.



NO.	Block Type	Module ID.	Signal Type	Scan Time	Master Start_R...	Slave Start_R...	Reg_Num	Err_Cnt	Err_State	Remark
0	US1 Block	1	Write_nH...	1	40001	41001	10			
1										
2										
3										

The Err_Cnt value represents the number of times the scan block fails to communicate with the slave device. After the scan block is configured, if there is no connection with the slave device or if communication fails, this value will be incremented by 1 after each scan cycle.

This value is an indication of the status and efficiency of the communication. For example, if the value keeps incrementing, this means that the communication has failed. This could be due to a faulty physical connection between the DataSite controller and the slave device, or due to incorrect parameter settings. In addition, a low value indicates a more efficient communication.

If the Err_State value is 1, it means the communication has failed. A value of 0 indicates that the communication is OK.

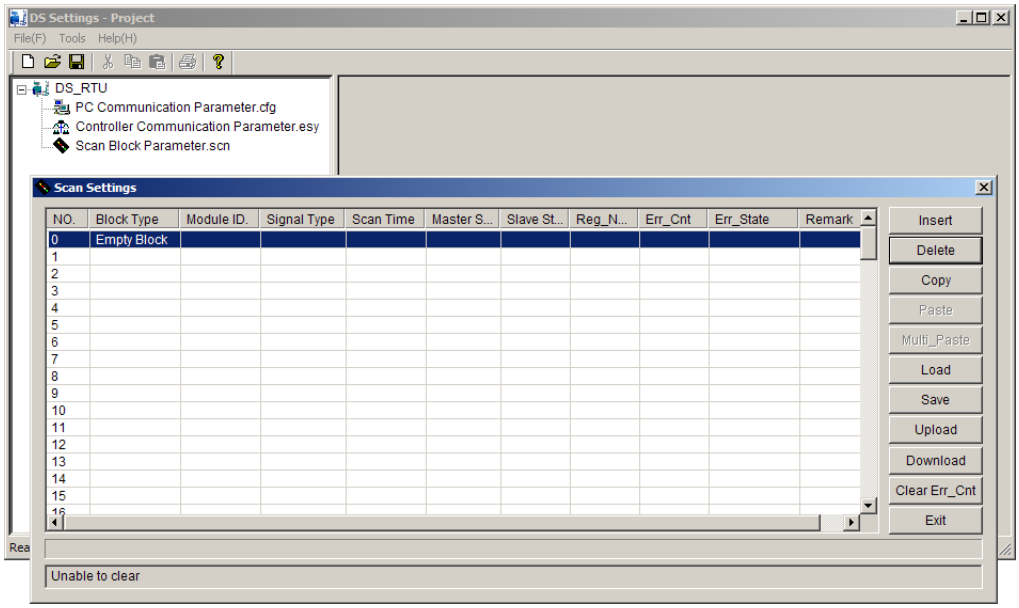
Open the Scan Settings Dialog Box

Follow these steps to open the Scan Settings dialog box.

- From the Tools menu, choose Scan Settings.

  The Scan Settings dialog box appears. The file, Scan Block Parameter.scn, located in the current project directory, is displayed on the project browser file pane.

TIP You can also double-click the Scan Block Parameter.scn file in the project browser file pane to open the Scan Settings dialog box.

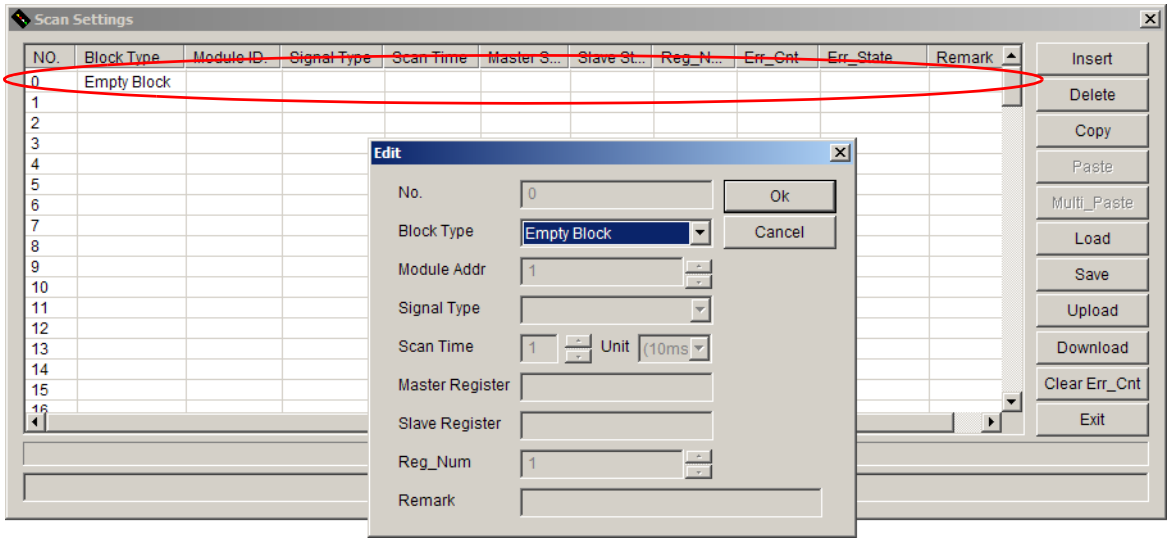


Edit a Scan Block

Follow these steps to edit a scan block.

1. In the Scan Settings dialog box, double-click the scan block you want to edit.

   The Edit dialog box appears.



2. Enter the values for the scan block parameters.
   See the table Scan block parameters and their descriptions on page 35.

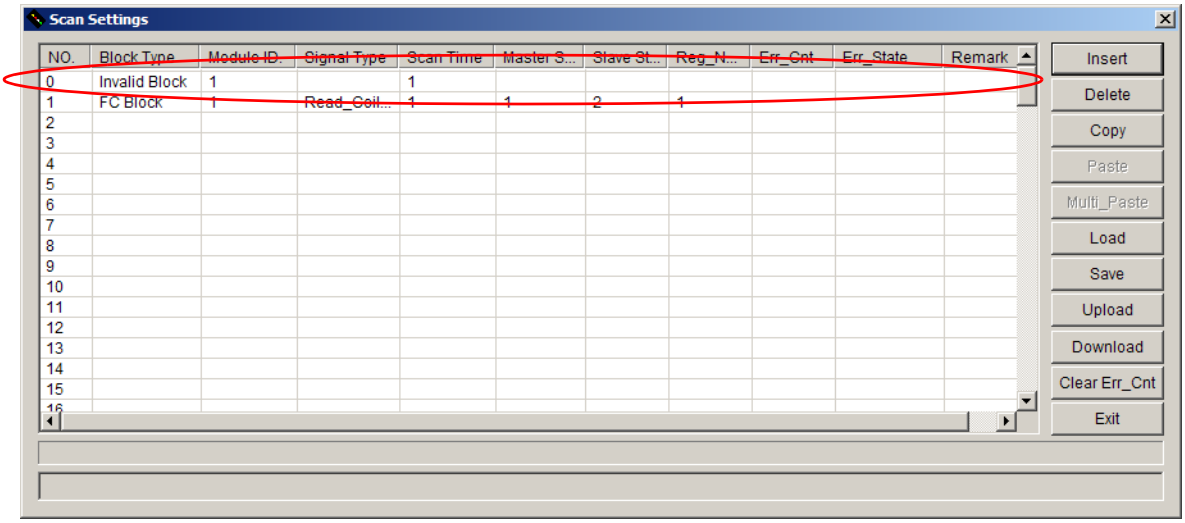
3. To save the changes and close the Edit dialog box, click OK.
   To close the Edit dialog box without saving, click Cancel.

Insert a Scan Block

Follow these steps to insert a scan block.

1. In the Scan Settings dialog box, select a scan block.
2. Click Insert.

   An Invalid scan block is created and inserted above the block you selected in Step 1.



3. Double-click the block to edit it.
4. To save the changes and close the Edit dialog box, click OK.
   To close the Edit dialog box without saving, click Cancel.

Delete a Scan Block

Follow these steps to delete a scan block.

1. Select the block you want to delete.
2. Click Delete.

   A dialog box prompting you to confirm the deletion appears.

3. To confirm the deletion, click OK.
   To cancel the deletion, click Cancel.

Copy a Scan Block

Follow these steps to copy a scan block.

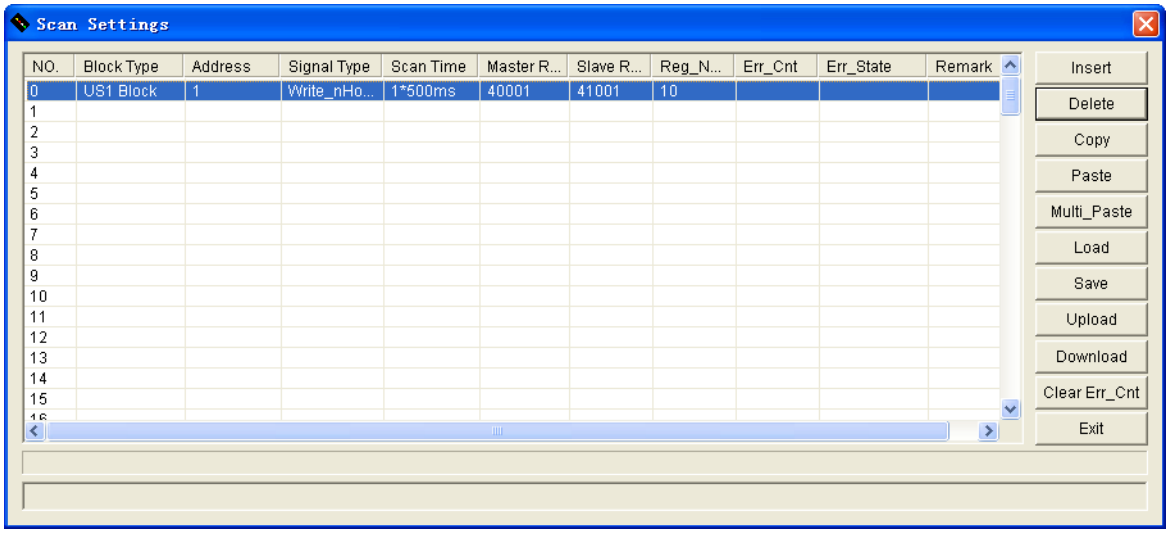
1. Select the block you want to copy.
2. Click Copy.

   The selected scan block is copied.

Paste a Scan Block

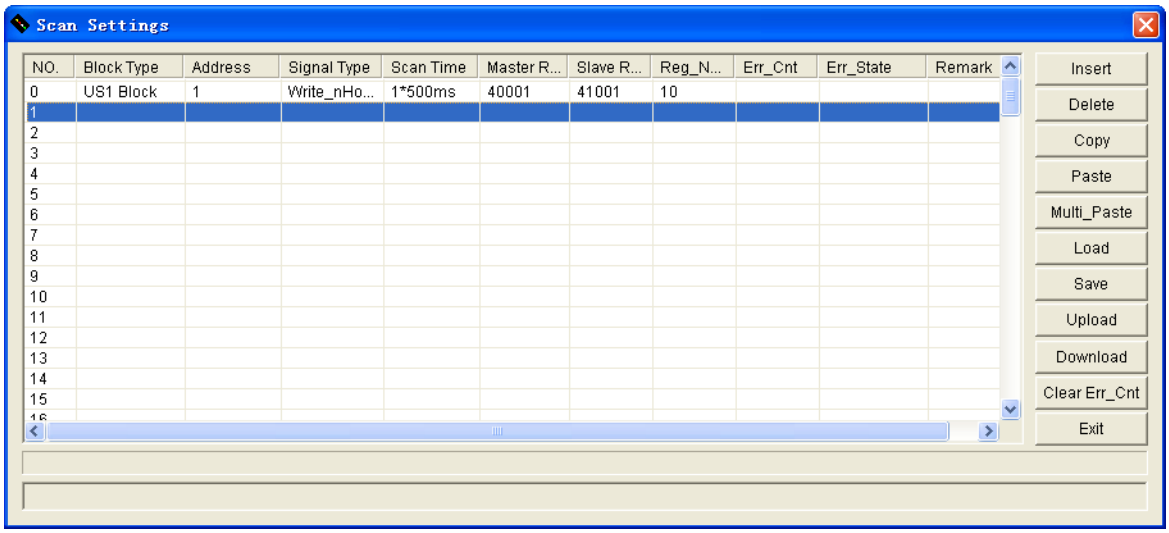
Follow these steps to paste a block.

1. Select the block you want to copy and paste.
2. Click Copy to copy the block.

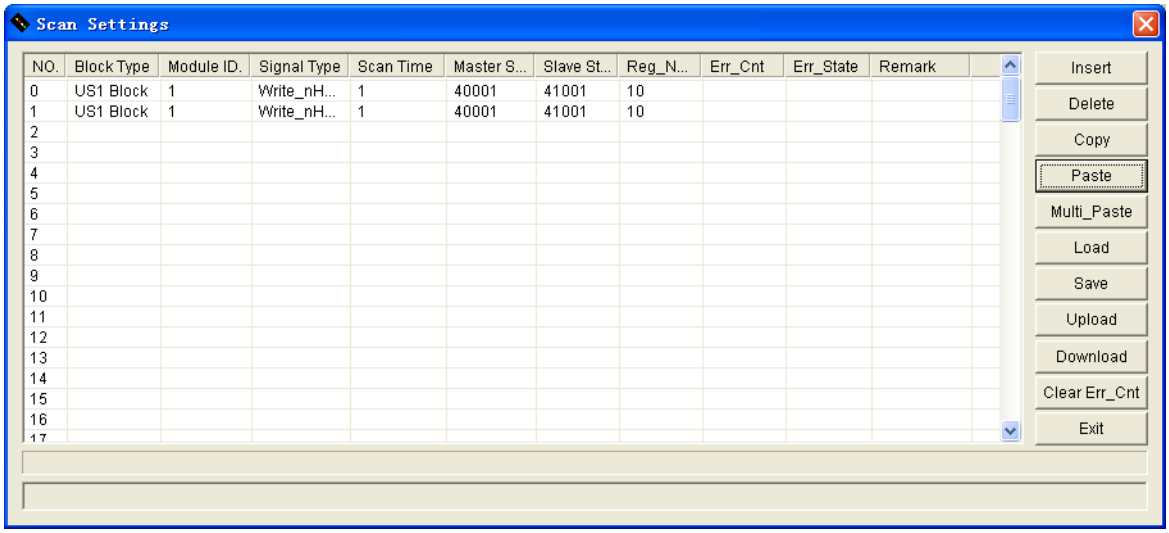


3. Select the row you want to paste the copied block to.

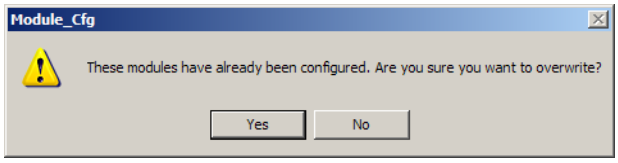
TIP You can only select an empty row that is right after the selected block, or a row that already contains a block.



4. Click Paste to paste the copied block.



If you are pasting over a row that already contains a block, the following dialog box appears.



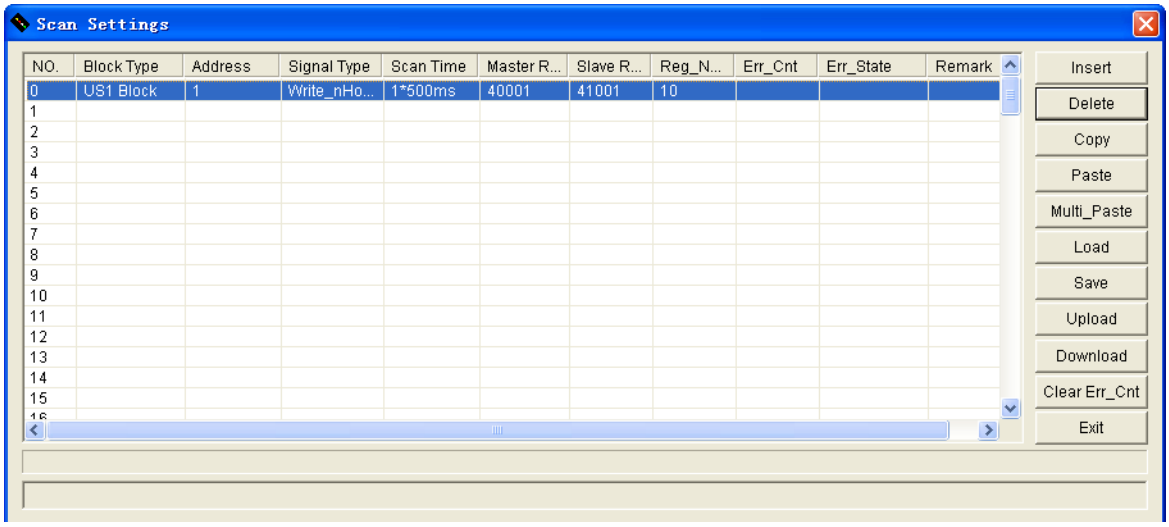
Click Yes to overwrite the block, or No to cancel the pasting.

Paste a Scan Block to Multiple Rows

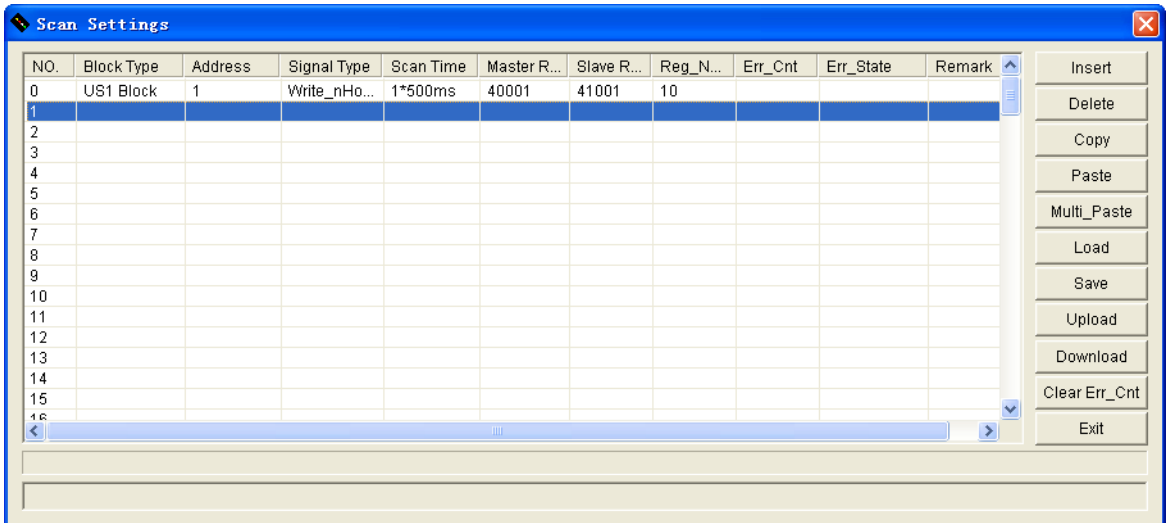
The Multi_Paste function allows you to paste a copied block to multiple rows.

Follow these steps to paste a copied block to multiple rows.

1. Select the block you want to copy and paste.
2. Click Copy to copy the block.

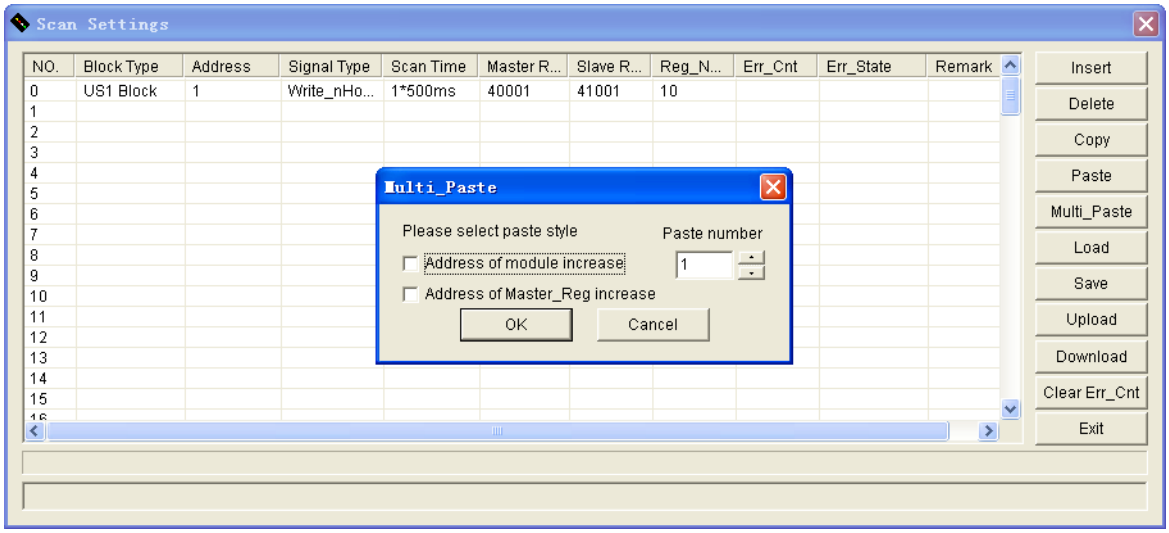


3. Select the *first* row you want to paste the copied block to.



4. Click Multi_Paste.

   The Multi_Paste dialog box appears.



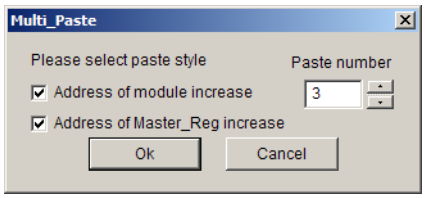
5. In the Multi_Paste dialog box:

   To increment the module ID of the pasted block by 1, select the check box for Address of module increase.

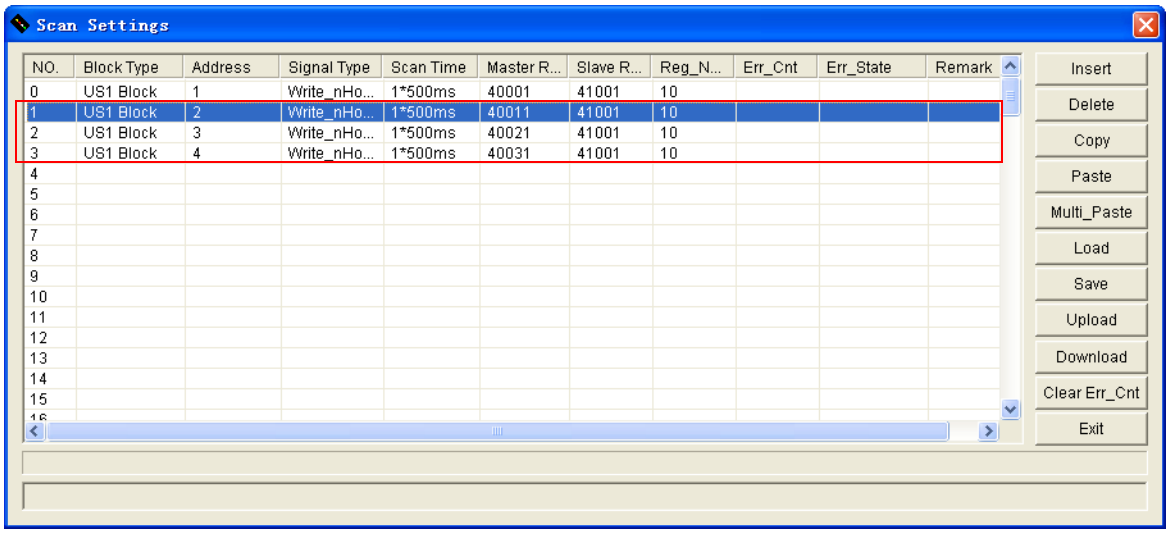
   To increment the Master Start_register address of the pasted block by 1, select the check box for Address of Master_Reg increase.

   In the Paste number box, enter the number of blocks you want to paste.

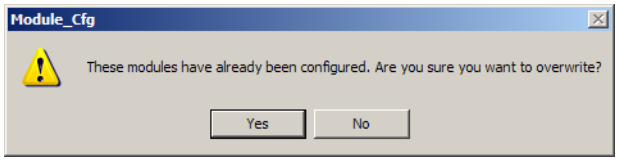
In this example, if the following settings are made:



the result will be this:



If you are pasting over a row that already contains a block, the following dialog box appears:



Use the Shortcut Menu

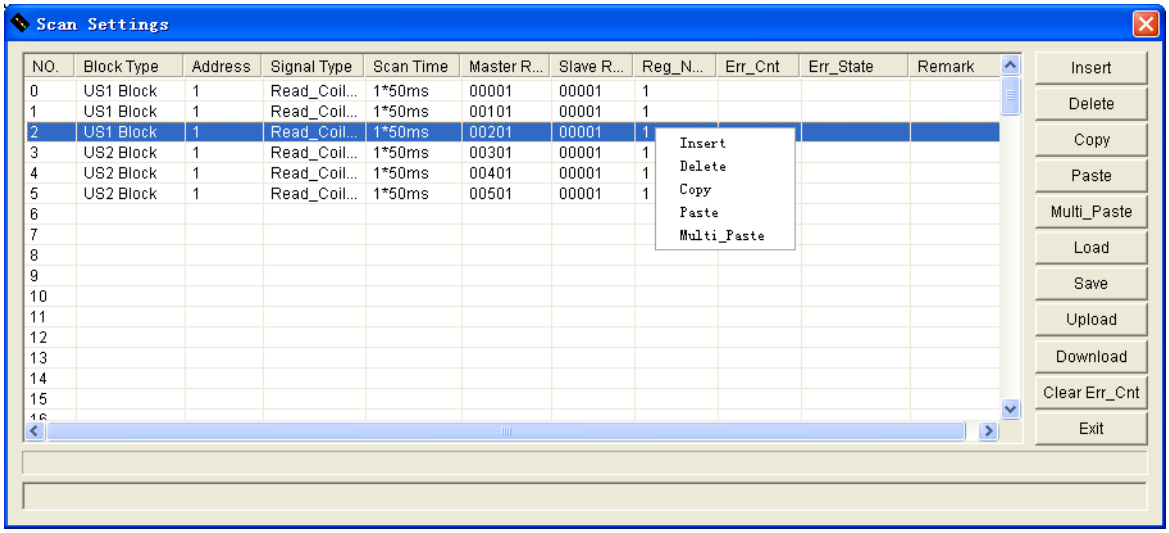
You can also use the shortcut menu for Insert, Delete, Copy and Paste functions.

Follow this step to use the shortcut menu.

- Right-click the row you want to apply the function to.

  The shortcut menu appears.

  Here is an example.



Load the Scan Settings

This function enables you to load the scan settings from the file buffer. This allows you to verify the configuration while the DataSite controller is offline.

Follow this step to load previously saved scan settings.

- Click Load.

  The last saved Scan Block Parameter configuration is loaded from the file, Scan Block Parameter.scn and the message, "Load from file successful", appears in the left corner of the status bar.

Save the Scan Settings

This function saves the scan settings into a file buffer on the PC.

Follow this step to save scan settings.

- Click Save.

  The settings are written to the file, Scan Block Parameter.scn and the message, "Save into file successful", appears in the left corner of the status bar.

Upload the Scan Settings from the Controller

Follow this step to upload (read) scan settings from the DataSite controller. The controller needs to be online before you can upload the settings.

- Click Upload.

Download the Scan Settings to the Controller

Follow this step to download (write) scan settings to the DataSite controller. The controller needs to be online before you can download the settings.

- Click Download.

Clear the Error Count

Follow this step to clear the error count in the scan blocks.

- Click Clear Err_Cnt.

Close the Scan Settings Dialog Box

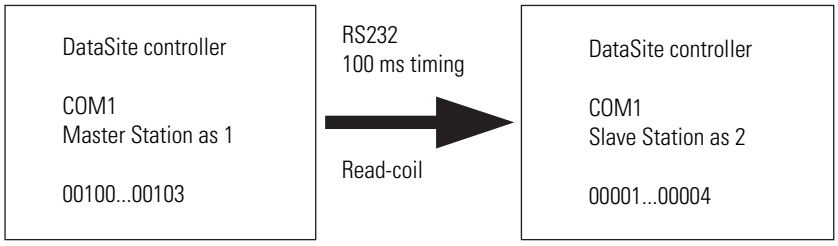
Follow this step to close the Scan Settings dialog box.

- Click Exit.

Configuration Example

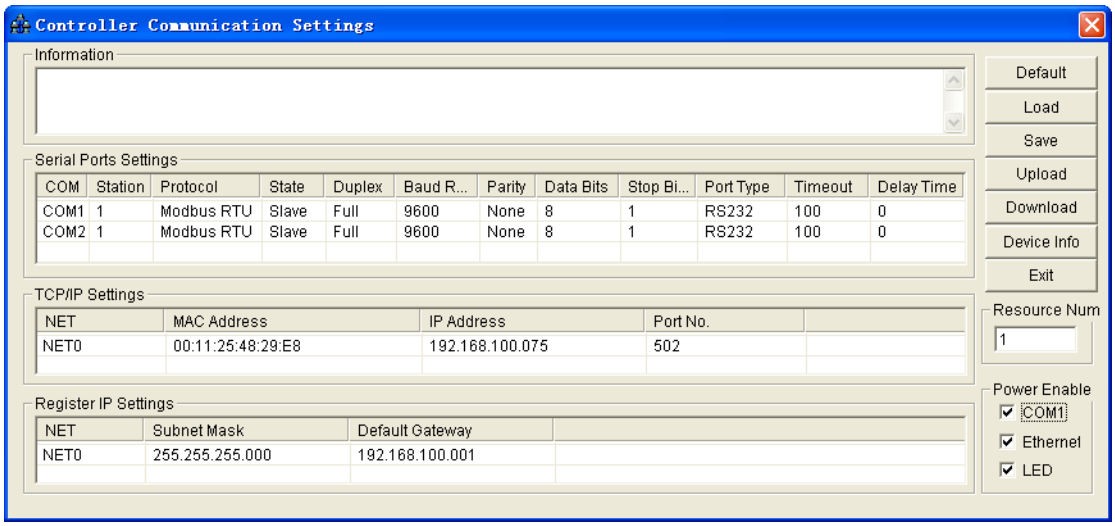
By configuring a scan block as a US1 or US2 block, we can read from and write to the equipment connected with the DataSite controller.

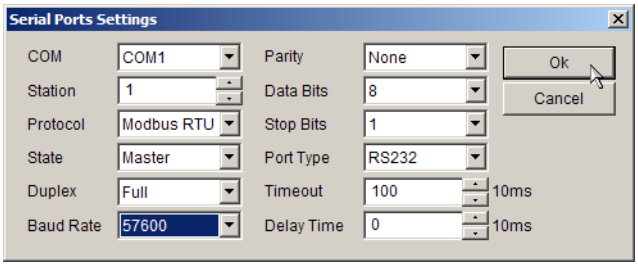
For example, we can take two DataSite controllers connected via RS232 serial communication, with COM1 of one DataSite controller as the master station, and COM1 of the other controller as the slave station. The master station can read/write the slave station's signal via the serial communication between the two stations.

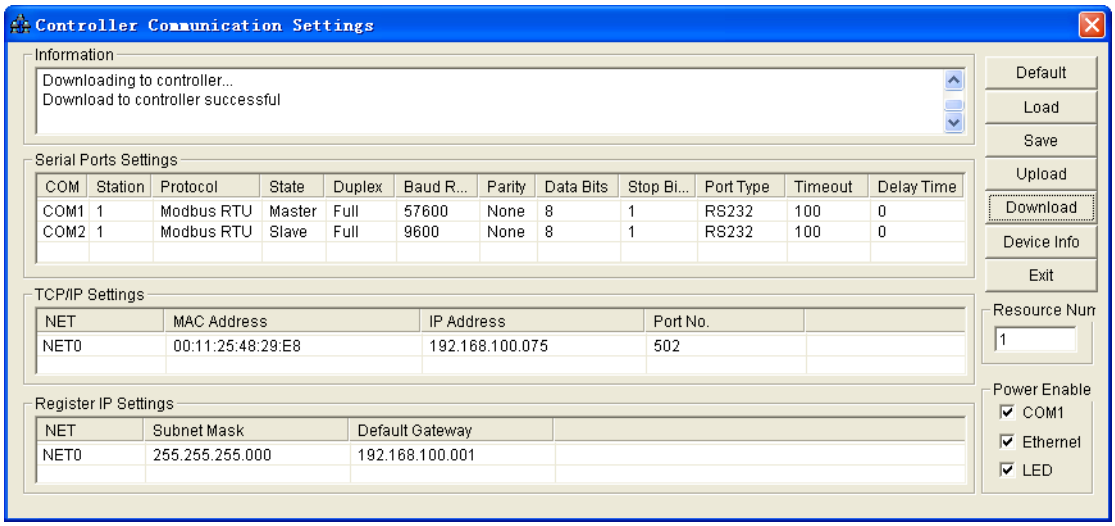


The following subsections provide you with one way of configuring the DataSite controllers in this example.

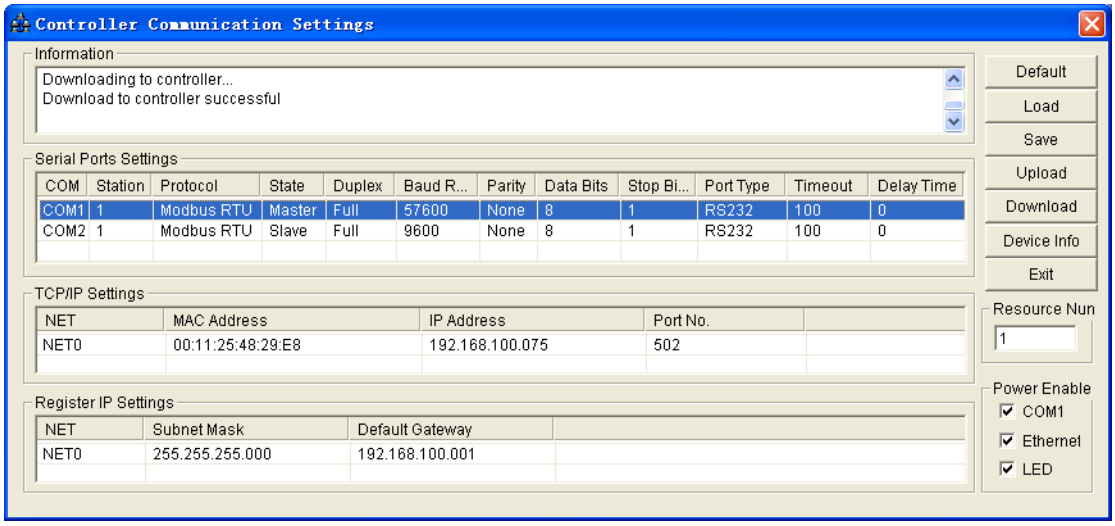
Step 1: Configure the Controller Communications Settings for the Modbus Master Station

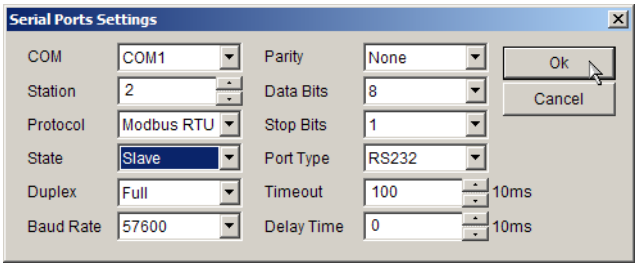


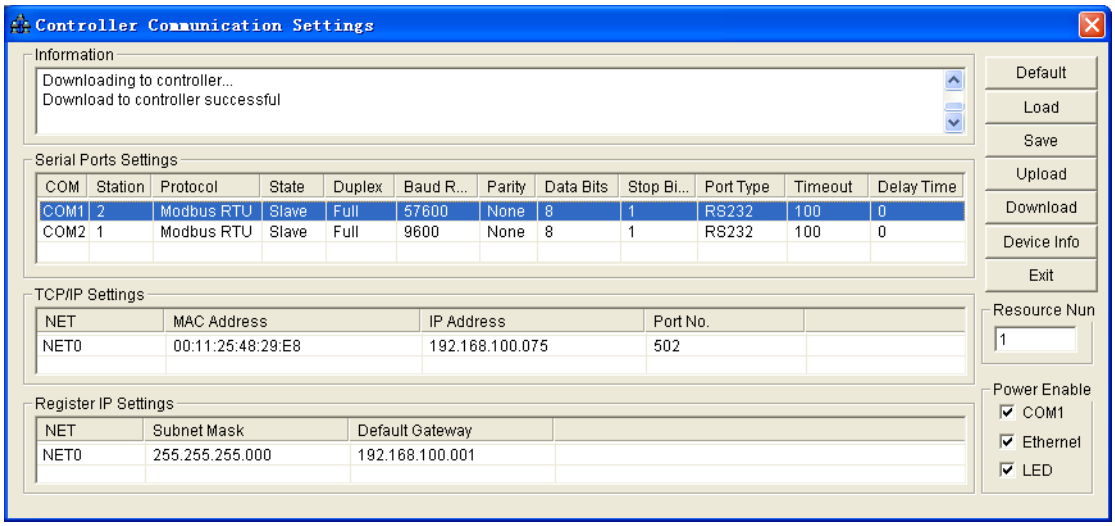


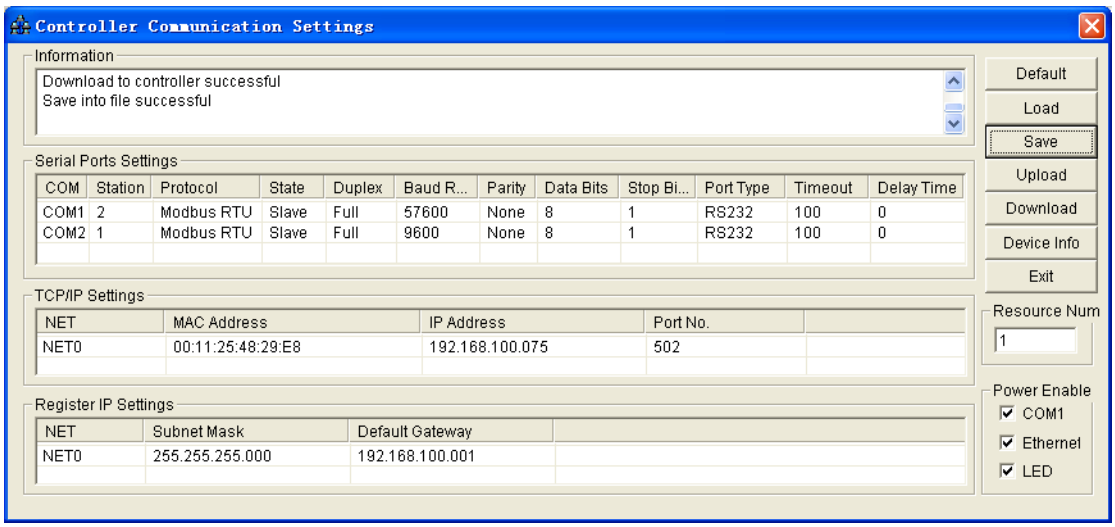


Step 2: Configure the Controller Communications Settings for the Modbus Slave Station

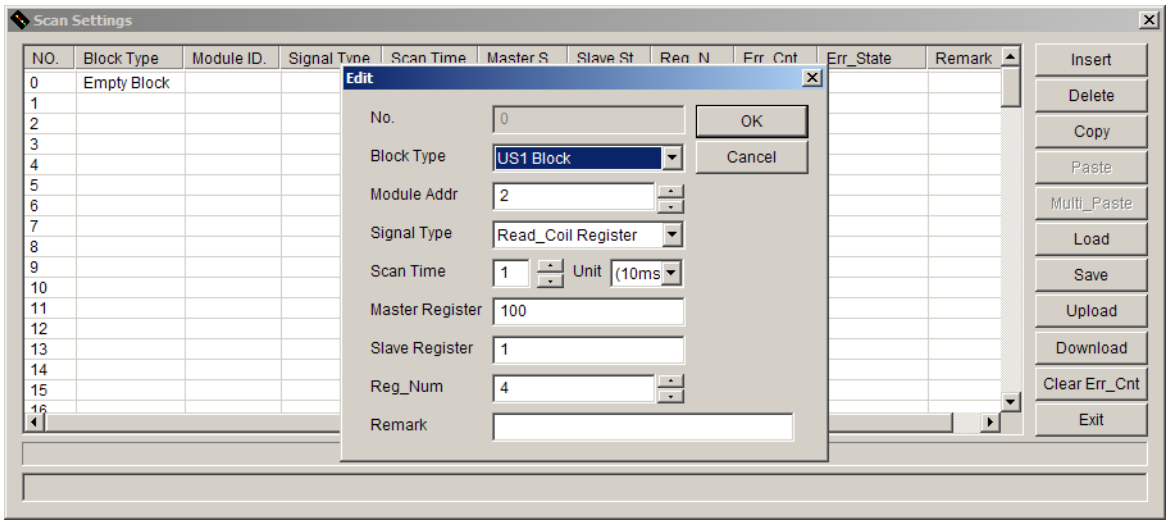


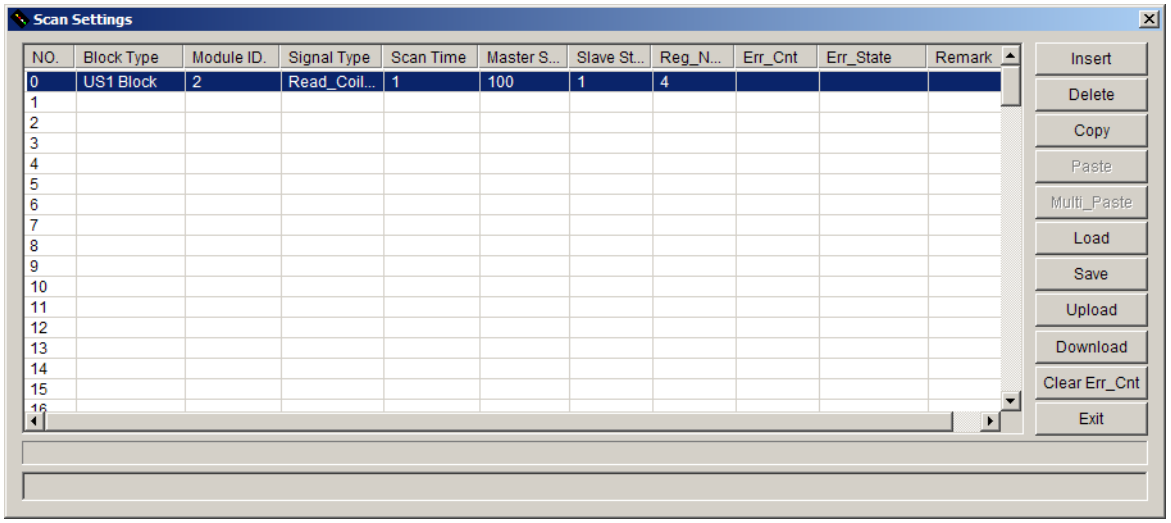



Controller Communication Settings
Information
Downloading to controller...
Download to controller successful
Default
Load
Save
Upload
Download
Device Info
Exit
Serial Ports Settings
COM Station Protocol State Duplex Baud R... Parity Data Bits Stop Bi... Port Type Timeout Delay Time
COM1 2 Modbus RTU Slave Full 57600 None 8 1 RS232 100 0
COM2 1 Modbus RTU Slave Full 9600 None 8 1 RS232 100 0
TCP/IP Settings
NET MAC Address IP Address Port No.
NET0 00:11:25:48:29:E8 192.168.100.075 502
Resource Nun
1
Register IP Settings
NET Subnet Mask Default Gateway
NET0 255.255.255.000 192.168.100.001
Power Enable
COM1
Ethernet
LED

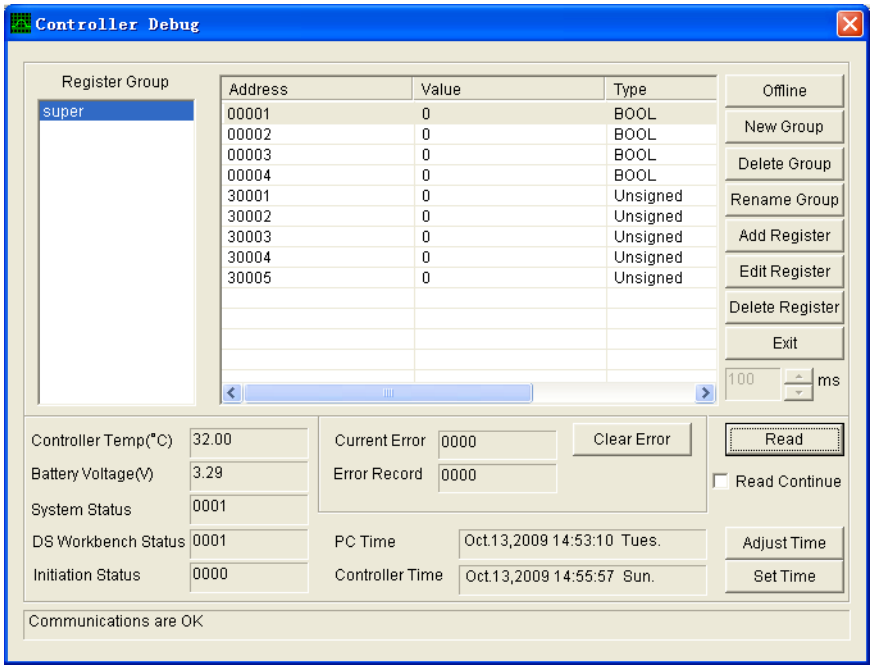

Controller Communication Settings
Information
Download to controller successful
Save into file successful
Default
Load
Save
Upload
Download
Device Info
Exit
Serial Ports Settings
COM Station Protocol State Duplex Baud R... Parity Data Bits Stop Bi... Port Type Timeout Delay Time
COM1 2 Modbus RTU Slave Full 57600 None 8 1 RS232 100 0
COM2 1 Modbus RTU Slave Full 9600 None 8 1 RS232 100 0
TCP/IP Settings
NET MAC Address IP Address Port No.
NET0 00:11:25:48:29:E8 192.168.100.075 502
Resource Num
1
Register IP Settings
NET Subnet Mask Default Gateway
NET0 255.255.255.000 192.168.100.001
Power Enable
COM1
Ethernet
LED

Step 3: Configure Scan Settings for the Modbus Master Station





Step 4: Read Master registers to verify communication between Master station and Slave station



TIP 00001…00004 are the DO signal registers of the slave DataSite controller, and 00100…00103 are the configured slave registers corresponding to DO signal registers of the slave DataSite controller.

Configure HART Settings

Use HART Settings to configure and send HART command messages.

TIP Customized function blocks that can be triggered in the user program to provide HART read/write functions are also available. For more information, see the DataSite Customized Function Blocks Reference Manual, 1758-RM001 .

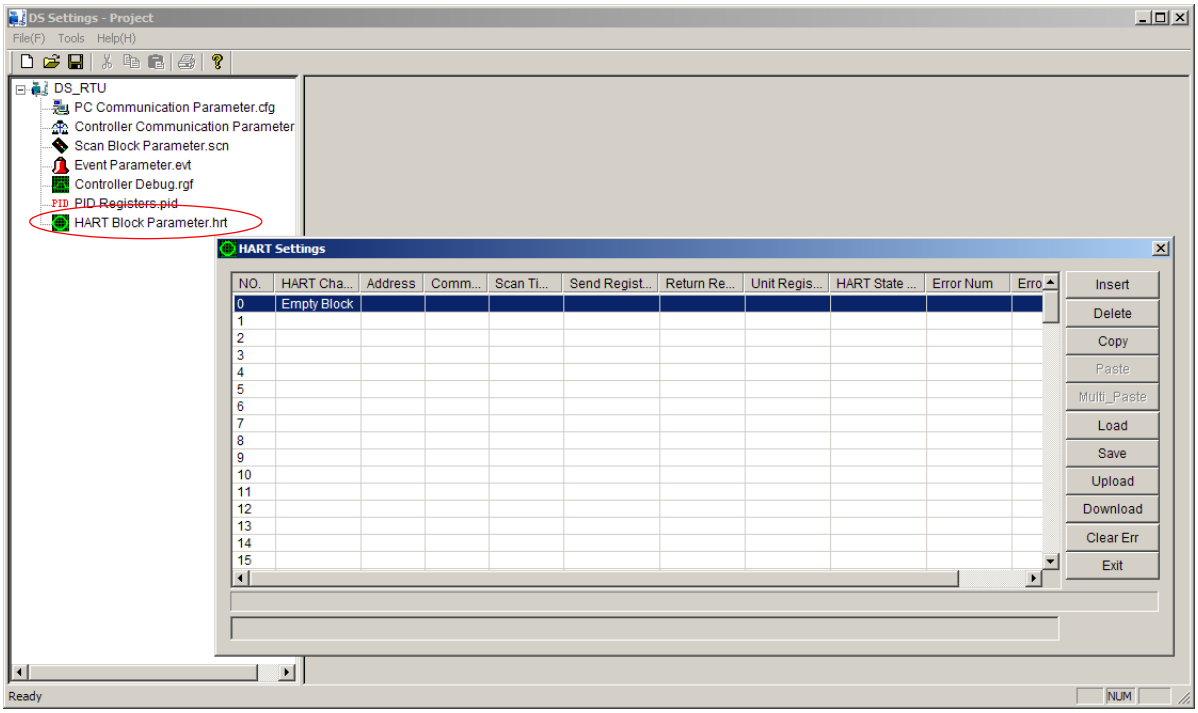
Open the HART Settings Dialog Box

Follow this step to open the HART Settings dialog box.

- From the Tools menu, choose HART Settings.

  The HART Settings dialog box appears. The file, HART Block Parameter.hrt, located in the current project directory is displayed on the project browser file pane.

TIP You can also double-click the HART Block Parameter.hrt file in the project browser file pane to open the HART Settings dialog box.



This table provides a description of the column headers in the HART Settings dialog box.

Description of HART block parameters

Header	Description
NO.	Serial number of each HART scan block.
HART Channel	Channel for the HART interface module to send commands to. The effective range is 0…2. • The HART0 channel supports multi-branched HART scan, and the data of up to 13 pieces of HART equipment can be scanned. • The HART1 and HART2 channels are point-to-point scan, and not only do they support HART protocol communication, they also support standard 4…20 mA signals.
Address	Communication address of the HART equipment. The effective range is 0…15.

Description of HART block parameters (Continued)

Header	Description
Command	HART command to be sent to the HART equipment. The effective value of each HART command is as follows: • Read Unique Identifier: 0 • Read Primary Variable:1 • Read P. V. Current And Percent Of Range: 2 • Read Dynamic Variable And P. V. Current: 3 • Read Transmitter Variables: 15 • Read Primary Variable Output Information: 33 • Reset Configuration Changed Flag: 38 • Read additional Transmitter Status: 48 • Read Transmitter Variable Information: 54
Scan Time	Time cycle of scanning HART equipment data. Effective range is 50 ms…50 hours.
Send Register	Register for storing command data. Effective range is 40003…49999 for 1758-RTU controllers and 40003…47999 for 1758-FLO controllers.
Return Register	Register for storing command response data. Effective range is 40003…49999 for 1758-RTU controllers and 40003…47999 for 1758-FLO controllers.
Unit Register	Register for storing the unit of HART equipment data returned. Effective range is 40003…49999 for 1758-RTU controllers and 40003…47999 for 1758-FLO controllers.
HART State Addr	Register for storing HART equipment state returned. Effective range is 40003…49999 for 1758-RTU controllers and 40003…47999 for 1758-FLO controllers.
Err_Cnt	Number of times an error occurs. After the HART scan block is configured, if there is no connection with the slave device or if communication fails, this value will be incremented by 1 after each scan cycle. This value is updated whenever Upload is clicked.
Err_State	Error state of HART scan block configuration. If the Err_State value is 1, it means the communication has failed. A value of 0 indicates that the communication is OK.

IMPORTANT

HART scan data blocks are configured in sequence and each block has a corresponding number. The maximum number of modules is 128.

When one data block is an empty block, all the blocks configured after this empty data block will be invalid.

Here is an example of a HART configuration list:

NO.	HART Channel	Address	Comm...	Scan Ti...	Send Regist...	Return Re...	Unit Regis...	HART State ...
0	0	1	0	34	41101	41121	41141	41161
1	0	1	1	34	41201	41221	41241	41261
2	0	2	0	34	41301	41321	41341	41361
3	0	2	3	35	41401	41421	41441	41461
4	1	0	0	35	41501	41521	41541	41561
5	1	0	3	35	41601	41621	41641	41661
6	2	0	0	35	41701	41721	41741	41761
7	2	0	3	35	41801	41821	41841	41861

Understand HART Commands

Some of the variables read from HART equipment are 32-bit floating-point values. Every floating-point value is stored in two continuous data registers. The higher 16 bits of this value will be stored in the register with a higher address and the lower 16 bits of this value will be stored in the register with a lower address. For example, if a 32-bit double precision IEEE floating point number, such as 1234.5678 is to be stored, two registers, such as register 40108 and register 40109 can be combined to store the number. In hexadecimal, 1234.5678 is 449A 552B. The DataSite controller will store 449A in register 40109 and 522B in register 40108.

Registers Used in HART Commands

The following table lists the number of registers used in each HART command for the four register types, namely Send, Return, Unit and HART state.

Number of registers used in each HART command

Command	Description	Number of registers			
		Send register	Return register	Unit register	HART state register
0	Read Unique Identifier	0	10	0	2
1	Read Primary Variable	0	2	1	2
2	Read P. V. Current And Percent Of Range	0	4	0	2
3	Read Dynamic Variable And P. V. Current	0	10	4	2
15	Read Transmitter Variables	0	10	0	2
33	Read Primary Variable Output Information	4	12	4	2
35	Write Primary Variable Range Values	9	0	0	2
38	Reset Configuration Changed Flag	0	0	0	2
40	Enter/Exit Fixed Primary Variable Current Mode	4	0	0	2
44	Write Primary Variable Units	1	0	0	2

Number of registers used in each HART command (Continued)

Command	Description	Number of registers			
		Send register	Return register	Unit register	HART state register
48	Read additional Transmitter Status	0	13	0	2
54	Read Transmitter Variable Information	1	10	2	2
59	Write Number Of Response Preambles	1	0	0	2

If the number of registers is 0 in any command, you do not have to enter a register address.

The register range is 40003…49999 for 1758-RTU controllers, and 40003…47999 for 1758-FLO controllers.

Description of HART Commands

The following table provides a description of each HART command and the registers that it uses.

Description of HART commands

Command	**0**
Purpose	Read the equipment identifier. This command must be configured for each HART device in order for the other commands to work.
Send register	Not used
Return register	+0 = manufacturer ID code, 8-bit unsigned integer
	+1 = manufacturer equipment type code, 8-bit unsigned integer
	+2 = forerunner character number, 8-bit unsigned integer
	+3 = global command revision level, 8-bit unsigned integer
	+4 = transmitter revision level, 8-bit unsigned integer
	+5 = software revision level, 8-bit unsigned integer
	+6 = hardware revision level, 8-bit unsigned integer
	+7 = equipment function flags, 8-bit unsigned integer
	+8, 9 = Device Identification Number (double), 24-bit unsigned integer
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**1**
Purpose	Read primary variable (P. V.)
Send register	Not used
Return register	+0, 1 = P. V. (float point)

Description of HART commands (Continued)

Unit register	+0 = unit
HART state register	+0 = state 0
	+1 = state 1
Command	**2**
Purpose	Read primary variable current and percentage of span
Send register	Not used
Return register	+0, 1 = P. V. current mA (float point)
	+2, 3 = P. V. percentage (float point) Purpose
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**3**
Purpose	Read dynamic variables and primary variable current
Send register	Not used
Return register	+0, 1 = Primary Variable current (float point)
	+2, 3 = Primary Variable value (float point)
	+4, 5 = Secondary Variable value (float point)
	+6, 7 = Tertiary Variable value (float point)
	+8, 9 = Fourth Variable value (float point)
Unit register	+0 = Primary Variable unit code, 8-bit unsigned integer
	+1 = Secondary Variable unit code, 8-bit unsigned integer
	+2 = Tertiary Variable unit code, 8-bit unsigned integer
	+3 = Fourth Variable Unit code, 8-bit unsigned integer
HART state register	+0 = state 0
	+1 = state 1
Note	Not all equipment return primary, secondary, tertiary and fourth variables. If the equipment does not support them, zero is written into the value and units unit code for that variable.
Command	**15**
Purpose	Read Transmitter Variables
Send register	Not used
Return register	+0 = alarmselect code
	+1 = transfer function code, 8-bit unsigned integer
	+2 = P. V. range units code, 8-bit unsigned integer
	+3, 4 = upper range value (float point)
	+5, 6 = lower range value (float point)
	+7, 8 = damping value (second) (float point)
	+10 = private-label distributor code, 8-bit unsigned integer

Description of HART commands (Continued)

Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**33**
Purpose	Read appointed transmitter variables
Send register	+0 = variable 0 code, 8-bit unsigned integer
	+1 = variable 1 code, 8-bit unsigned integer
	+2 = variable 2 code, 8-bit unsigned integer
	+3 = variable 3 code, 8-bit unsigned integer
Return register	+0, 1 = Variable 0 value (float point)
	+2, 3 = Variable 1 value (float point)
	+4, 5 = Variable 2 value (float point)
	+6, 7 = Variable 3 value (float point)
Unit register	+0 = Variable 0 unit code, 8-bit unsigned integer
	+1 = Variable 1 unit code, 8-bit unsigned integer
	+2 = Variable 2 unit code, 8-bit unsigned integer
	+3 = Variable 4 unit code, 8-bit unsigned integer
HART state register	+0 = state 0
	+1 = state 1
Command	**35**
Purpose	Write Primary Variable Range Values
Send register	+0 = Primary Variable 0 code, 8-bit unsigned integer
	+1, 2 = Primary Variable upper range value (float point)
	+3, 4 = Primary Variable lower range value (float point)
Return register	Not used
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**38**
Purpose	Reset Configuration Changed Flag
Send register	Not used
Return register	Not used
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**40**
Purpose	Enter/Exit Fixed Primary Variable Current Mode

Description of HART commands (Continued)

Send register	+0, 1 = Actual fixed Primary Variable current level, units of milliamperes (float point)
Return register	Not used
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**44**
Purpose	Write Primary Variable Units
Send register	+0 = Primary Variable units code, 8-bit unsigned integer
Return register	Not used
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**48**
Purpose	Read Additional Transmitter Status
Send register	Not used
Return register	+0, 2 = device specific status, 8-bit unsigned integer
	+3 = Operational modes, 8-bit unsigned integer
	+4, 5 = Analog outputs saturated, 24-bit unsigned integer
	+6, 7 = Analog outputs fixed, 24-bit unsigned integer
	+8, 13 = Device-specific status, 8-bit unsigned integer
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**54**
Purpose	Read Transmitter Variable Information
Send register	+0 = Code for transmitter variable to be zeroed, 8-bit unsigned integer
Return register	+0 = Return code for transmitter variable to be zeroed, 8-bit unsigned integer
	+1, 2 = Transmit variable sensor serial number, 24-bit unsigned integer
	+3 = Transmit variable limits units code,8-bit unsigned integer
	+4, 5 = Transmit variable upper limit (float point)
	+6, 7 = Transmit variable lower limit (float point)
	+8, 9 = Transmit variable damping value (seconds) (float point)
	+10, 11 = Transmit variable minumum span (float point)

Description of HART commands (Continued)

Unit register	+0 = Transmit variable code, 8-bit unsigned integer
	+1 = Transmit variable limits units code, 8-bit unsigned integer
HART state register	+0 = state 0
	+1 = state 1
Command	**59**
Purpose	Write Number of Responses Preambles
Send register	+0 = Number of preambles to be sent with the Response message from the Slave to the Master, 8-bit unsigned integer, between 5 and 20
Return register	Not used
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1

Variable and Command

Each piece of HART equipment is designed differently. For example, when you use command 3 to read variables from HART equipment, the four dynamic variables returned may have different meanings, and not all four variables may be valid. Refer to the documentation for the HART equipment for more information. See also the table, Description of HART commands.

Response Message

The response message of a piece of HART equipment contains the Err Num and Err State values. The Err Num value indicates the number of times communication with the HART equipment has failed. The Err State value indicates whether communication with the HART equipment is a success or failure. An Err State value of 0 means that communication with HART equipment is successful. An Err State value of 1 means that the communication with HART equipment has failed.

Err_Cnt	Err_State
0	0
0	0
0	0
0	0

You can also read the response code from the HART equipment. It is stored as two bytes in the state register which you have configured in the HART scan block. If bit 7 in the first byte is 1, this byte is bit-mapped and all the communication errors are displayed in this byte. If bit 7 in the first byte is 0, this byte is not bit-mapped and the meaning is determined by the value of bit 6 through bit 0.

The following tables list the definition of the first two bytes of the response code according to the HART protocol.

First byte when bit 7 = 1 (Communication Error)

Bit	Value	Description
6	hex C0	Parity error
5	hex A0	Overrun error
4	hex 90	Framing error
3	hex 88	Checksum error
2	hex 84	0 (reserved)
1	hex 82	Rx buffer overflow
0	hex 81	Overflow (undefined)

First byte when bit 7 = 0 (Command Response)

Bit	Description
0(1)	No command-specific error
1(1)	(Undefined)
2(1)	Invalid selection
3(1)	Passed parameter too large
4(1)	Passed parameter too small
5(1)	Too few data bytes received
6(1)	Device-specific command error (rarely used)
7	In write-protect mode
8	This bit can mean any of the following: •Update failure—Returned real-time data has not changed since last read from field device. •Warning: Update failure—Real-time data returned has not changed since last read. •Warning: Set to nearest possible value—Command is accepted but limitations of the field device has caused data sent to be rounded or truncated. •Warning: Update in progress—Results of a command are excluded from its status because the command is still in the process of being completed. •Warning: External input is not set to 4…20 mA temperature. •Warning: Time is corrupt. •Warning: Units and 4/20 points set to new sensor limits.
9	This bit can mean any of the following: •Lower range value too high—Lower range value is greater than the upper sensor limit. •Applied process too high—Process applied to the field device is too high. •Not in proper current mode—Field device is not in fixed current mode, or the current has not been set to the correct value. •Not in proper analog output mode—Field device is not in fixed analog output mode, or the analog output has not been set to the correct value.

First byte when bit 7 = 0 (Command Response) (Continued)

Bit	Description
9 (Continued)	• Invalid module type code—Selected module type code is not valid. • Invalid flange type code—Selected flange type code is not valid. • Frequency set point too high—Value entered for the frequency set point is too high. • Density high limit too high—Value entered for the density high limit is too high. • Selected totalizer cannot be reset—Totalizer selected for display and tertiary variable cannot be reset. • Invalid page—Page requested is not supported. • Invalid level units. • Filter auto-adjust error. • Maximum zeroing time is too large. • DI too high—Value of the first density data is too high. • Not in reference or sample mode. • Invalid date. • Invalid alarm relay HOLD default code. • Frequency too high.
10	This bit can mean any of the following: • Lower range value too low—Lower range value is less than the lower sensor limit. • Applied process too low—Process applied to the field device is too low. • Multidrop not supported—Field device does not support multidrop. • Invalid range code—Range code selected is not valid. • Calibration location not set to user—Before this command can be accepted, the calibration location must be set to User. • Invalid configuration for special calibration—Configuration is not set properly for special calibration. • Invalid liner material code—Liner material code selected is not valid. • Frequency set point too low—Value entered for the frequency set point is too low. • Density high limit too low—Value entered for the density high limit is too low. • Invalid address—Address for this field device is not valid. • Trim location not set to user—Before this command can be accepted, trim location must be set to User. • Invalid body type code. • Invalid volume units. • Invalid density units. • Maximum zeroing time is too small. • DI too low—Value of the first density data is too low. • Instrument in reference mode. • Invalid analog output type code. • Invalid automatic temperature compensation code. • Invalid alarm relay configuration code. • Frequency too low. • Invalid low/high millivolt code

First byte when bit 7 = 0 (Command Response) (Continued)

Bit	Description
11	This bit can mean any of the following: • Upper range value too high—Upper range value is greater than the upper sensor limit. • Excess correction attempted—Correction attempted is outside of the permissible limits of the field device. • In multidrop mode—When in multidrop mode, this command cannot be performed. The analog output is deactivated and cannot be used when the polling address is set to a value within the range of 1…15. • Invalid sensor type code—Sensor type code selected is not valid. • Invalid sensor material code—Sensor material code selected is not valid. • Invalid base volume units code—Base volume units code selected is not valid. • Invalid base flow units code—Base flow units code selected is not valid. • Flow rate set point too high—Value entered for the flow rate set point is too high. • Density low limit too high—Value entered for the density low limit is too high. • Access denied—Access to this part of the memory is not allowed. • Invalid transmitter variable code. • Invalid item number. • Invalid wetted material code. • Standard deviation too large. • D2 too high—Value of the second density data is too high. • Instrument in sample mode. • Invalid calibration point. • Flow rate factor too high. • Invalid analog output HOLD code.
12	This bit can mean any of the following: • Upper range value too low—Upper range value is less than the lower sensor limit. • Invalid characterization—Characterization of the sensor is not valid. • Invalid number of wires—Number of wires on the sensor is not valid. • Invalid calibration point units code—Units code sent with the calibration point is not valid. • Invalid calibration location code—Calibration location code selected is not valid. • Invalid base time units code—Base time units code selected is not valid. • Flow rate set point too low—Value entered for the flow rate set point is too low. • Incorrect format—Format of the parameter entered is not correct. • Density low limit too low—Value entered for the density low limit is too low. • Write to ROM attempted—Writing of data to read-only memory is attempted. • Invalid units code. • Invalid sensor connection code. • Invalid trim points units code—Units code sent with the trim point is not valid. • Invalid trim location code—Trim location code selected is not valid. • Invalid base mass time units. • Invalid base volume time units. • Standard deviation too small. • Standard factor format.

First byte when bit 7 = 0 (Command Response) (Continued)

Bit	Description
12 (Continued)	• D2 too low—Value of the second density data is too low. • Invalid command number. • Invalid density units and calibration point. • Flow rate factor too low.
13	This bit can mean any of the following: • Upper and lower range values out of limits—Upper and lower range values are outside of their limits. • Range and sensor type not entered—Before characterization, range and sensor type need to be entered. • Invalid number of bytes—The Number of Bytes parameter received in this command is not valid. • Invalid meter option—Meter option selected is not valid. • Special sensor not available—Calibration for special sensor is not available. • Invalid transfer function code. • Invalid strapping point number. • Invalid base mass flow units. • Invalid base volume flow units. • Invalid trim point number. • Invalid cutoff type code. • Invalid security code. • Invalid alarm relay delay time code.
15	This bit can mean any of the following: • Invalid analog output number code. • Invalid level value. • Invalid alarm relay number code. • Invalid buffer number code.
16	Access restricted
28	Invalid range units code.
32	Device is busy
64	Command not implemented

(1) Bits 6…0 are decoded as an integer, and not bit-mapped.

Second byte - when unused

Bit	Description
7	All bits 0 (when a communication error is reported in the first byte).
6	
5	
4	
3	
2	
1	
0	

Second byte - Field Device Status

Bit	Value	Description
7	hex 80	Field device malfunction
6	hex 40	Configuration changed
5	hex 20	Cold start
4	hex 10	More status available
3	hex 08	Analog output current fixed
2	hex 04	Analog output saturated
1	hex 02	Nonprimary variable out of limits
0	hex 01	Primary variable out of limits

Insert a HART Scan Block

Follow these steps to insert a HART scan block.

1. In the HART Settings dialog box, select the row where you want to insert the scan block to and click Insert. Alternatively, you can double-click the row.
   Note that you cannot insert data after an empty data block.

   An Invalid scan block is inserted.

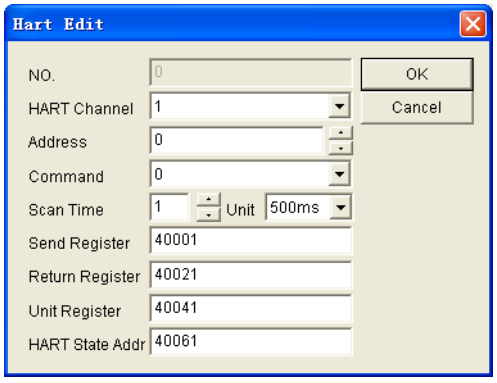
2. Double-click the block to edit.

Edit a HART Scan Block

Follow these steps to edit a HART scan block.

1. Double-click the block you want to edit.

   The Edit dialog box appears. The NO. box displays the serial number of the current HART scan block.



2. From the HART Channel pull-down menu, choose a channel for the HART interface module to send commands to. The effective range is 0…2.
   - The HART0 channel supports multi-branched HART scan, and the data of up to 13 pieces of HART equipment can be scanned.
   - The HART1 and HART2 channels are point-to-point scan, and not only do they support HART protocol communication, they also support data collection of 4…20 mA. You should set the HART address as 0.

3. In the Address box, specify the communication address of the HART equipment. The effective range is 0…15.

4. From the Command Num pull-down menu, choose the HART commands to be sent to the HART equipment. This table shows the effective value of each HART command.

Effective values of HART commands

Effective Value	HART Commands	Effective Value
0	Read Unique Identifier	
1	Read Primary Variable	
2	Read P. V. Current And Percent Of Range	
3	Read Dynamic Variable And P. V. Current	
15	Read Transmitter Variables	
33	Read Primary Variable Output Information	

Effective values of HART commands (Continued)

Effective Value	HART Commands	Effective Value
35	Write Primary Variable Range Values	Only Use in HART TRIG block
38	Reset Configuration Changed Flag	
40	Enter/Exit Fixed Primary Variable Current Mode	Only Use in HART TRIG block
44	Write Primary Variable Units	Only Use in HART TRIG block
48	Read additional Transmitter Status	
54	Read Transmitter Variable Information	
59	Write Number Of Response Preambles	Only Use in HART TRIG block

IMPORTANT Command 0 must be configured for each HART device in order for the other commands to work.

5. In the Scan Time box, enter the number of units and select the time unit to specify the time cycle of scanning HART equipment data.
   For example, if you enter "1" for the number of units, and select "(500 ms)" for the time unit, the scan time will be 1 x 500 ms = 500 ms. This means that the current HART scan block will be executed every 500 ms.

6. In the Send Register box, define the register for storing command data.

7. In the Return Register box, define the register for storing command response data.

8. In the Unit Register box, define the register for storing the unit of HART equipment data returned.

9. In the HART State Addr box, define the register for storing the HART equipment state returned.

TIP The register range is 40003…49999 for 1758-RTU controllers, and 40003…47999 for 1758-FLO controllers.

See Description of HART commands on page 58 for more information on the Send, Return, Unit, and HART State Addr registers.

10. Click OK.

    The Edit dialog box is closed and the settings are saved to the new block.

Delete a HART Scan Block

Follow these steps to delete a HART scan block.

1. Select the block you want to delete.
2. Click Delete.

   A dialog box prompting you to confirm the deletion appears.
3. To confirm the deletion, click OK.
   To cancel the deletion, click Cancel.

Copy a HART Scan Block

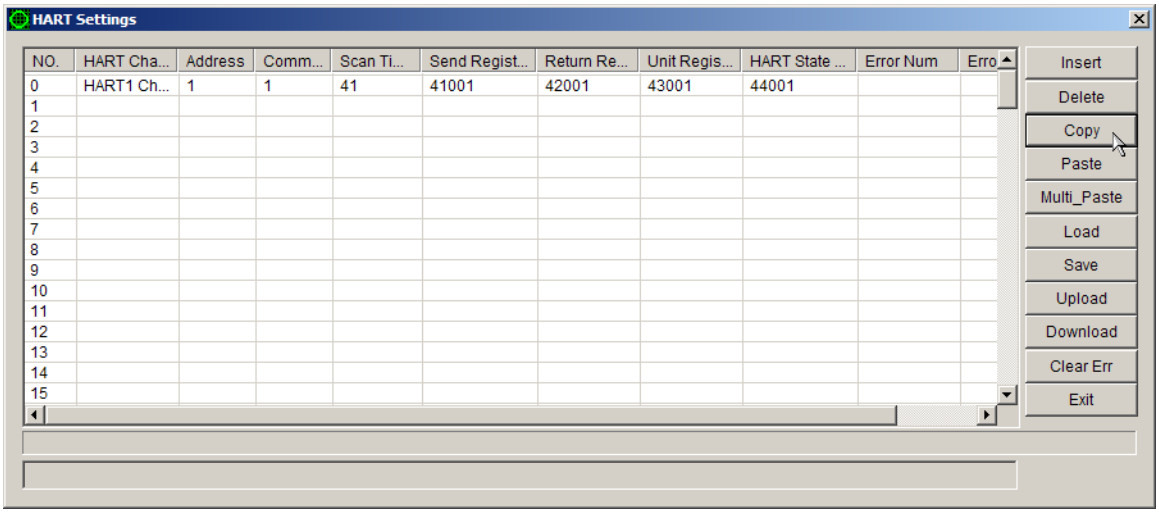
Follow these steps to copy a HART scan block.

1. Select the block you want to copy.
2. Click Copy.

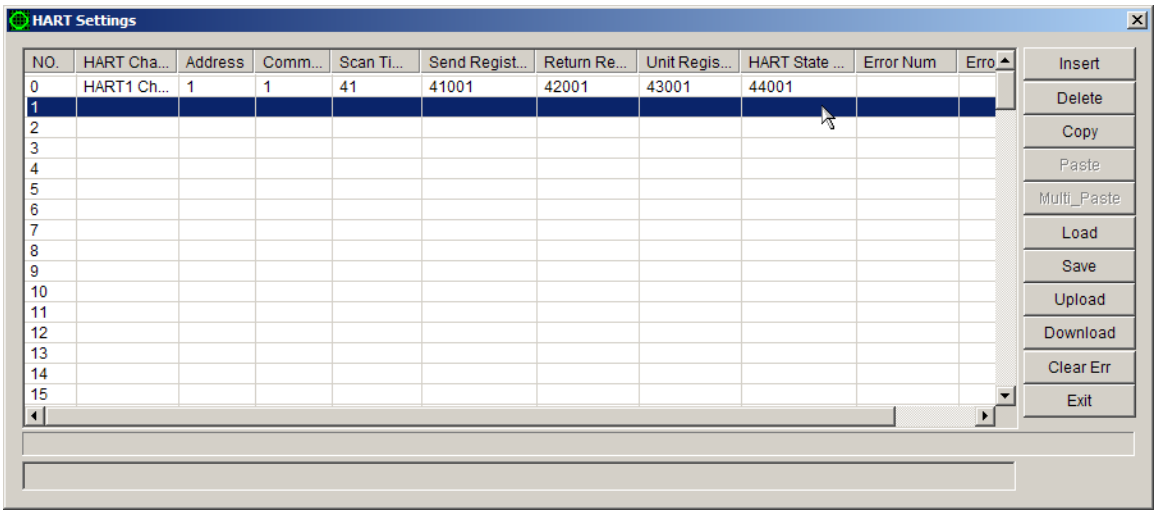
Paste a HART Scan Block

Follow these steps to paste a HART scan block.

1. Select the block you want to copy and paste.
2. Click Copy to copy the block.

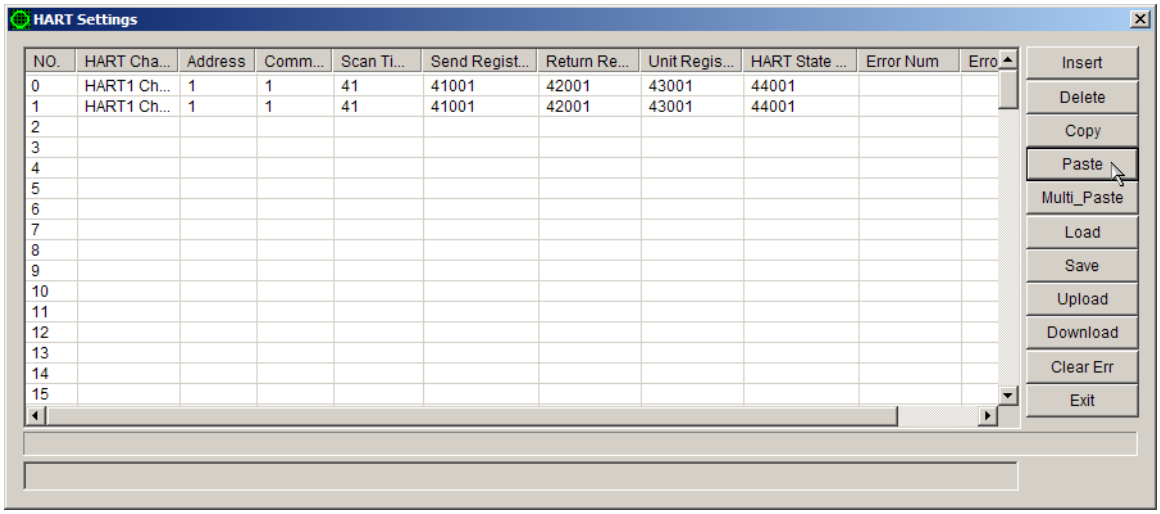


3. Select the row you want to paste the copied block to.

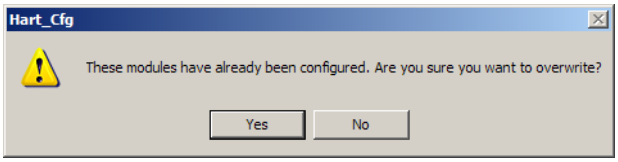


TIP You can only select an empty row that is right after the selected block, or a row that already contains a block.

4. Click Paste to paste the copied block.



If you are pasting over a row that already contains a block, the following dialog box appears.



Click Yes to overwrite the block, or No to cancel the pasting.

Paste a HART Scan Block to Multiple Rows

Use the Multi_Paste function to paste a HART scan block to multiple rows. This function works in the same way as the Multi_Paste function in the Scan Settings dialog box. For details, see Paste a Scan Block to Multiple Rows on page 45.

Use the Shortcut Menu

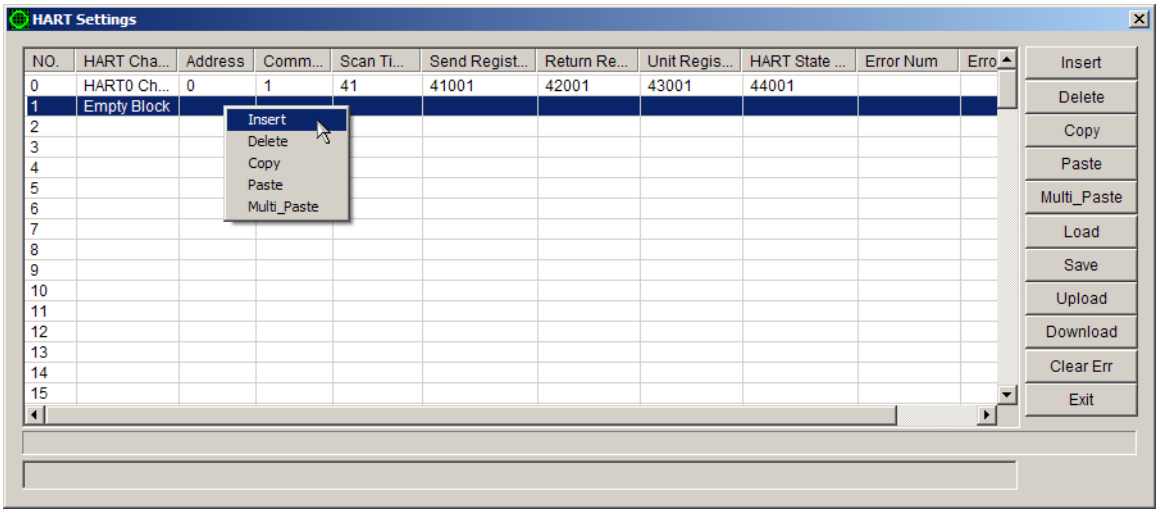
You can also use the shortcut menu for Insert, Delete, Copy and Paste functions.

Follow this step to use the shortcut menu.

- Right-click the row you want to apply the function to.

  The shortcut menu appears.

  Here is an example.



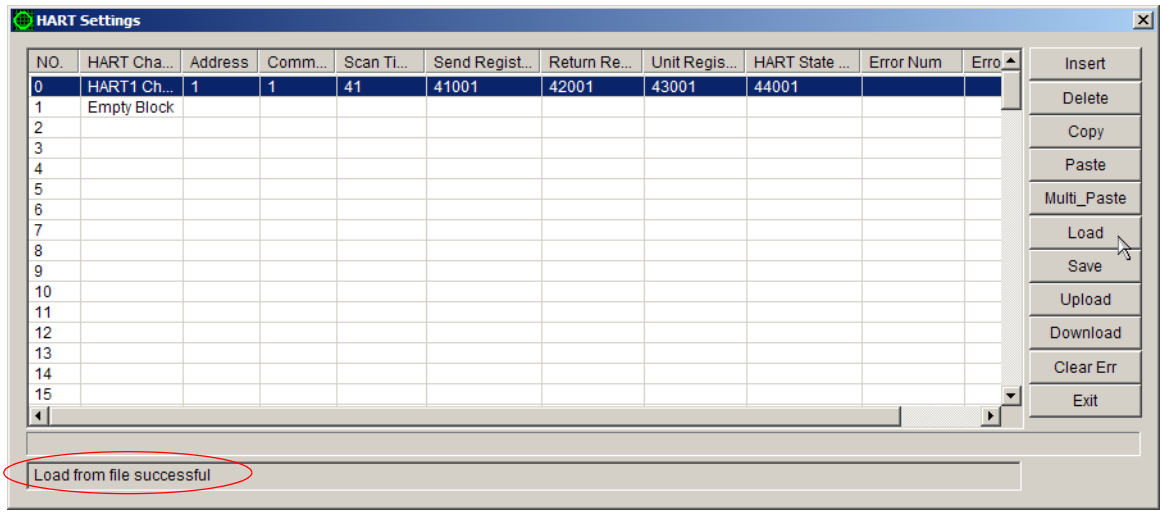
Load the HART Settings

This function enables you to load the HART settings previously saved in a file buffer on the PC. This allows you to verify the settings while the DataSite controller is offline.

Follow this step to load HART settings from the file.

- Click Load.

  If the settings are loaded successfully, the status bar will display the message, "Load from file successful".



Save the HART Settings

Follow this step to save the HART settings into a file buffer on the PC.

- Click Save.

  If the settings are saved successfully, the message, "Save into file successful" will be displayed in the status bar. The settings are saved to the file, HART Block Parameter.hrt, by default.

Upload the HART Settings from the Controller

Follow this step to upload (read) HART settings from the DataSite controller. The controller needs to be online before you can upload the settings.

- Click Upload.

Download the HART Settings to the Controller

Follow this step to download (write) HART settings to the DataSite controller. The controller needs to be online before you can download the settings.

- Click Download.

Clear the Error Count

Follow this step to clear the error count in HART scan data block of controller.

- Click Clear Err.

Close the HART Settings Dialog Box

Follow this step to close the HART Settings dialog box.

- Click Exit.

Configure Event Settings

Use Event Settings to configure these four types of RTC interruption events.

- System events
- Alarm events
- Calendar events
- Time events

Configuring these events in the Event Settings dialog box is equivalent to programming the corresponding function blocks in DataSite Workbench:

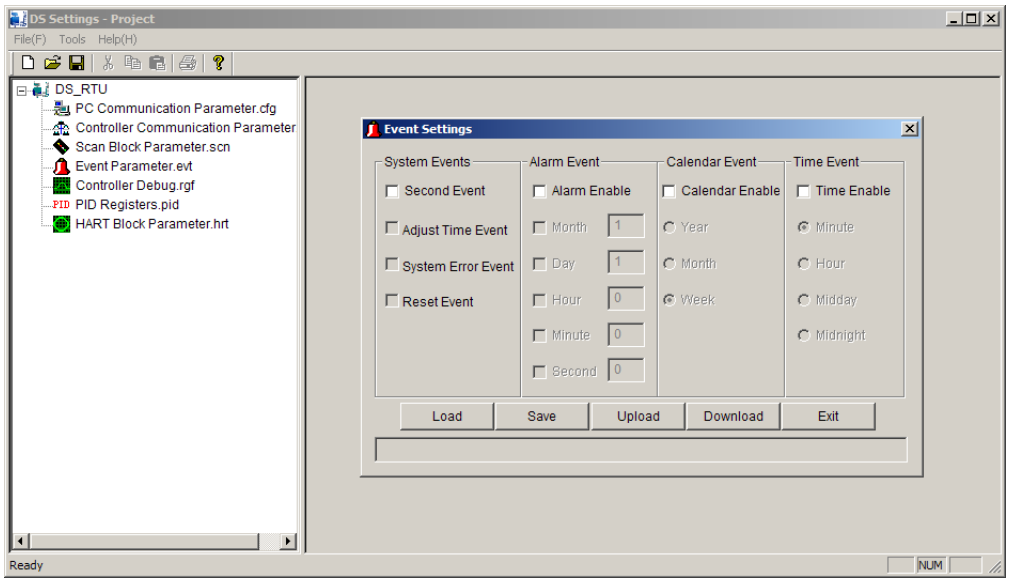
- System events: EV_SEC_CFG
- Alarm events: EV_CLK_CFG
- Calendar events: EV_CALE_CFG
- Time events: EV_TIME_CFG

For more information on using these function blocks, refer to the Customized Function Blocks for DataSite Reference Manual, publication 1758-RM001.

Follow this step to open the Event Settings dialog box.

- From the Tools menu, choose Event Settings.

  The Event Settings dialog box appears. The file, Event Parameter.evt, located in current project directory, is displayed on project browser file pane.



TIP You can also double-click the Event Parameter.evt file in the project browser file pane to open the Event Settings dialog box.

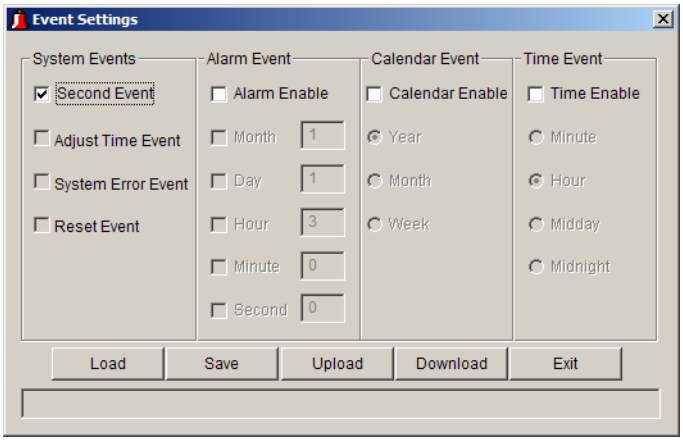
Event Examples

For an illustration on how the Event Settings dialog box can be used to configure an event, see the following examples.

Example for a System Event

Set and get a system event that occurs at one-second intervals.

1. In the Event Settings dialog box, select the Second Event check box. Then, click Download. Another method is to use EV_SEC_CFG and EV_RTC_SET to configure the second event.

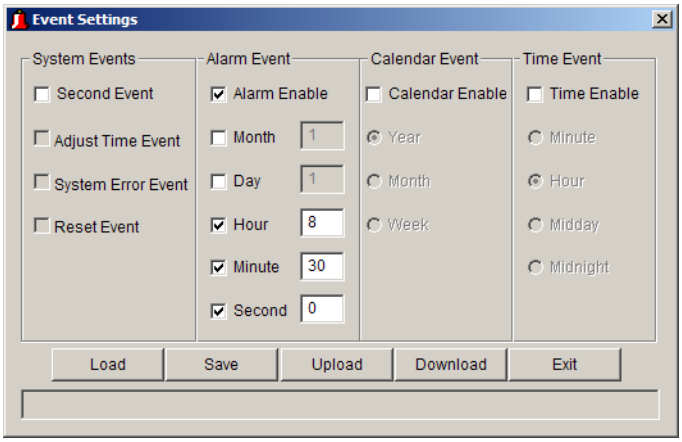


2. Use EV_GET to read the RTC return value and check bit 0 for the second event. Bit 0 will be set to '1' when the second event occurs.

Example for an Alarm Event

Set and get an alarm event at 8:30 a.m. every day.

1. In the Event Settings dialog box, select the Alarm Enable, Hour, Minute, and Second check boxes. Enter the time in the Hour, Minute, and Second boxes, and then click Download. Another method is to use EV_CLK_CFG and EV_RTC_SET to configure the alarm event.

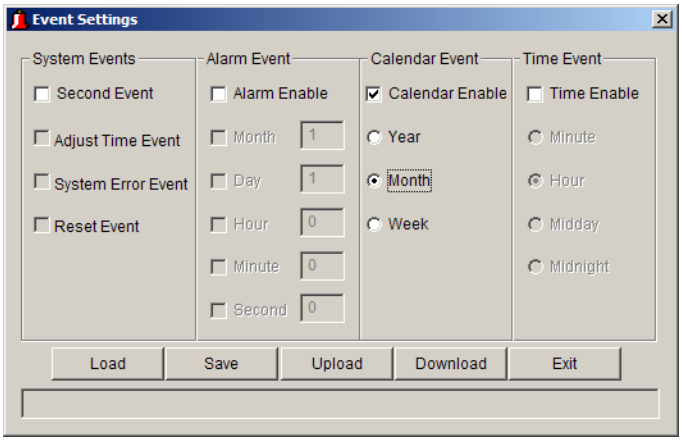


2. Use EV_GET to read the RTC return value and check bit 3 for the alarm event. Bit 3 will be set to '1' when the RTC event occurs.

Example for a Calendar Event

Set and get an event that occurs at 0 seconds, 0 minutes, 0 hours on the first day of every month.

1. In the Event Settings dialog box, select the Calendar Enable check box and click Month. Then, click Download. Another method is to use EV_CALE_CFG and EV_RTC_SET to configure the event.

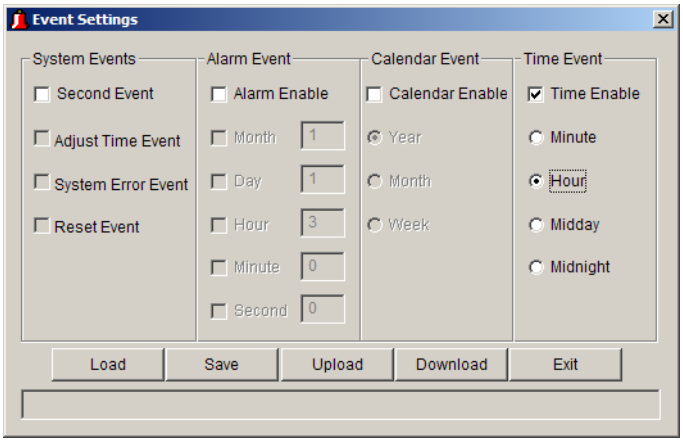


2. Use EV_GET to read the RTC return value and check bit 2 for the second event. Bit 2 will be set to '1' when the second event occurs.

Example for a Time Event

Set and get an event that occurs at 0 seconds, 0 minutes of every hour.

1. Select the Time Enable check box and click Hour in the Event Settings dialog box. Then, click Download. Another method is to use EV_TIME_CFG and EV_RTC_SET to configure the event.



2. Use EV_GET to read the RTC return value and check bit 1 for the second event. Bit 1 will be set to '1' when the second event occurs.

Configure a System Event

Follow this step to configure a system event.

- To enable an event interruption with an interval of 1s, select the Second Event check box.

  When you select this check box, the system will provide an interruption signal every second. You can program the EV_GET function block in DataSite Workbench to retrieve the interruption signals according to your application requirements.

Configure an Alarm Event

Follow these steps to configure an alarm event.

1. Select the Alarm Enable check box.

   Alarm events are enabled.

2. Select the check box for the date/time attribute you want to set.

3. For each check box you have selected in step 2, enter the date/time value in the corresponding box.

   The alarm event will be executed based on the frequency you set.

   For example, if you set Month as 1, Day 20, Minute 3, and Second 5, the alarm event will be executed annually at the third minute and fifth second of every hour on January 20.

Configure a Calendar Event

Follow these steps to configure a calendar event.

1. Select the Calendar Enable check box.

   Calendar events are enabled.

2. Select one of the options: Year, Month, Week.

   The option you select determines how frequently the calendar event routine will be executed.

   - Year

     Annually, on January 1, at 0 hours (midnight), 0 minutes, 0 seconds, a corresponding calendar interruption task you have written in DataSite Workbench is executed.

   - Month

     On the first day of every month at 0 hours (midnight), 0 minutes, 0 seconds, a corresponding calendar interruption task you have written in DataSite Workbench is executed.

   - Week

     On the Monday of every week at 0 hours (midnight), 0 minutes, 0 seconds, a corresponding calendar interruption task you have written in DataSite Workbench is executed.

Configure a Time Event

Follow these steps to configure a time event.

1. Select the Time Enable check box.

   Time events are enabled.

2. Select one of the options: Minute, Hour, Midday, Midnight.

   The option you select determines how frequently the time event routine will be executed.

   - Minute

     At 0 seconds of every minute, a corresponding time break task is executed in the application program written by users.

   - Hour

     At 0 seconds, 0 minutes, hourly, a corresponding time break task is executed in the application program written by users.

   - Midday

     At 0 seconds, 0 minutes, 12 hours (noon), daily, a corresponding time break task is executed in the application program written by users.

   - Midnight

     At 0 seconds, 0 minutes, 0 hours (midnight), daily, a corresponding time break task is executed in the application program written by users.

Upload Event Settings from the Controller

Follow this step to upload (read) the event settings from the DataSite controller. The controller needs to be online before you can upload the settings.

- Click Upload.

Download Event Settings from the Controller

Follow this step to download (write) event settings to the DataSite controller. The controller needs to be online before you can download the settings.

- Click Download.

Save the Event Settings

Follow this step to save the event settings into the file, Event Parameter.evt, on the PC.

- Click Save.

  If the settings are saved successfully, the message, "Save into file successful" will appear in the status bar of the Event Settings dialog box.

Load the Event Settings

IMPORTANT If you have made any changes in the Event Settings dialog box without saving them, the changes will be discarded once the saved settings are loaded from the file.

Follow this step to load event settings from the file, Event Parameter.evt.

- Click Load.

  If the settings are loaded from the file successfully, the message, "Load from file successful" will appear in the status bar of the Event Settings dialog box.

Close the Event Settings Dialog Box

Follow this step to close the Event Settings dialog box.

- Click Exit.

Debug the Controller Programs

The Controller Debug function allows you to use test registers and retrieve data from the DataSite controller for online or offline debugging of the user programs you have written for the controller in DataSite Workbench.

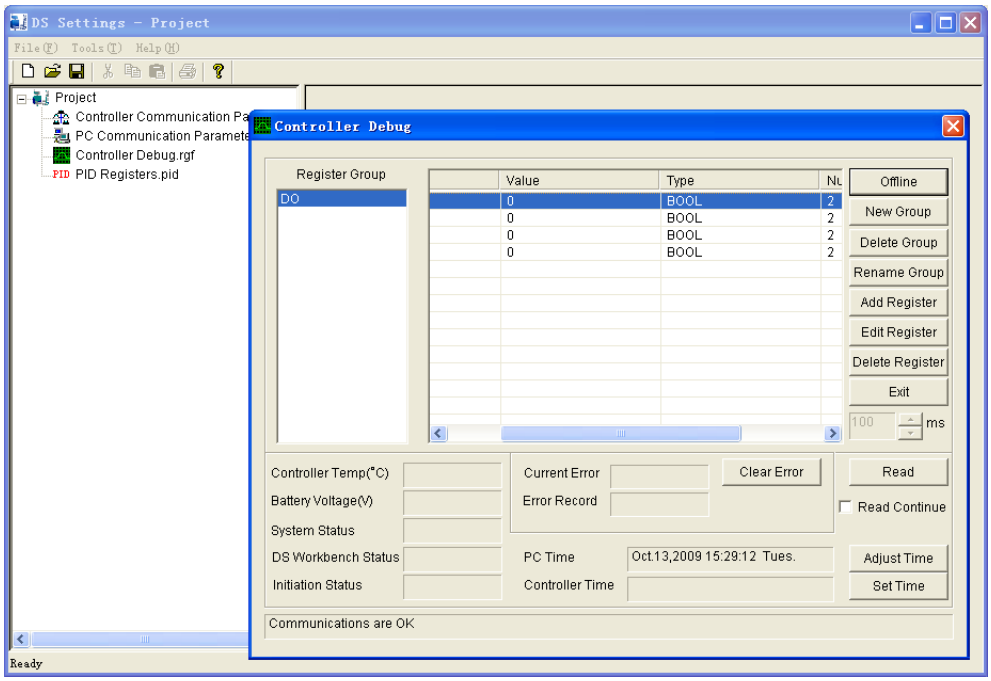
Note that you can use this function to view a DataSite register value. Only DataSite registers can be monitored. DataSite Workbench internal variables cannot be monitored unless they are written into a DataSite register.

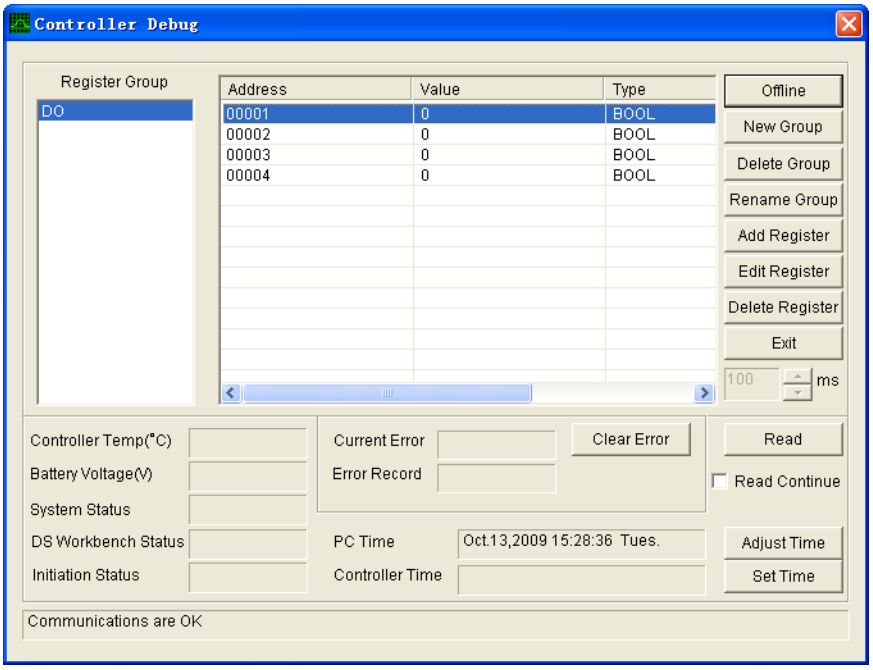
Open the Controller Debug Dialog Box

Follow this step to open the Controller Debug dialog box.

- From the Tools menu, choose Controller Debug.

  The Controller Debug dialog box appears, and the file, Controller Debug.rgf, located in the current project directory is displayed in the project browser file pane.





Toggle between Online and Offline Debugging

The Offline/Online button lets you toggle between online and offline debugging for test registers in the DataSite controller.

Follow this step to toggle between online and offline debugging modes.

- Click Offline/Online.

Set the Scan Time for the Online Debugging Mode

When you are debugging in the online mode, register data is refreshed at regular intervals. You may change this interval according to your requirements.

Follow these steps to set the scan time.

1. Click Offline to go to the offline mode.

TIP This value can only be set when you are in the offline debugging mode.

2. In the scan time box, enter a value for the desired time interval.

   The default interval is 100 ms.



3. Click Online to go to the online mode.

Add a Register Group

Follow these steps to add a group of registers.

1. Click New Group.

   The New Group box appears.



2. Enter a name for the new group.

3. Click OK.

   The new group is added and listed in the Register Group box.

Delete a Register Group

Follow these steps to delete a group of registers.

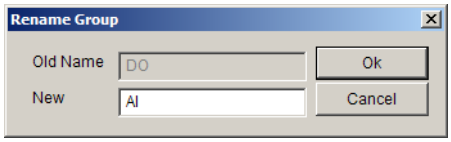
1. In the Register Group box, select the group you want to delete.
2. Click Delete Group.

   You are prompted to confirm the deletion.
3. To confirm the deletion, click OK.
   To cancel the deletion, click Cancel.

Rename a Register Group

Follow these steps to rename a register group.

1. In the Register Group box, select the register group you want to rename.
2. Click Rename Group.



3. In the New text box, enter a new name for the group.
4. Click OK.

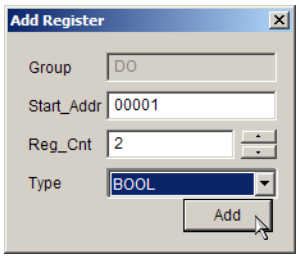
   The new name appears in the Register Group box.

Add Registers

Follow these steps to add new registers.

1. In the Register Group box, select the group you want to add a register to.
2. Click Add Register.

The Add Register dialog box appears.



3. In the Start_Addr text box, enter the address for the register.

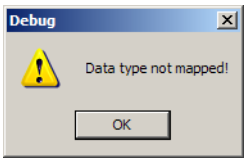
4. In the Reg_Cnt text box, enter the number of registers you want to add.

   If you are adding more than one register, the Start_Addr value will be the address for the first register. Subsequent registers will have consecutive addresses.

5. From the Type pull-down menu, select a register type from the following options:

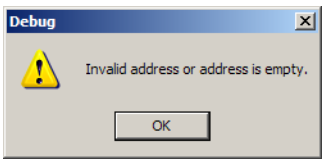
   - Unsigned 16 bit unsigned int
   - Signed 16 bit signed int
   - Float Point 32 bit float number
   - Hexadecimal Hexadecimal form
   - Binary binary form
   - ASCII ASCII code form
   - BOOL BOOL type

   If the selected register type does not map to Start_Addr, this error message appears. Click OK and reselect the register type.



6. Click Add.

   If the register address you entered is invalid, this error message appears. Click OK and re-enter the register address.

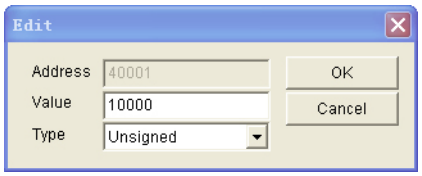


Edit a Register

Follow these steps to edit a register.

1. In the Register Group box, select the group which contains the register you want to edit.
2. Select the register and click Edit Register. Alternatively, you can double-click the register you want to edit.

   The Edit dialog box appears.



3. In the Value text box, enter the new value for the register.
4. From the Type pull-down menu, select the corresponding data type for the register address.
5. Click OK.

   The changes are saved.

Delete a Register

Follow these steps to delete a register.

IMPORTANT There is no Undo function for the Delete Register action.

1. In the Register Group box, select the group which contains the register you want to delete.
2. Select the register and click Delete Register.

   The register is deleted.

Read the Controller-Run Parameters

Operational parameters for the DataSite controller include Battery Voltage, Controller Temperature, System Status, and System Clock.

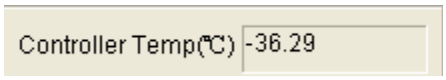
Follow this step to read these parameters from the controller.

1. Click Read.
2. To read these parameters continuously, select the Read Continue check box.

These parameters can be read by the application programs written using DataSite Workbench.

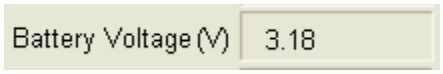
Controller Temperature

This is the internal temperature of the controller.

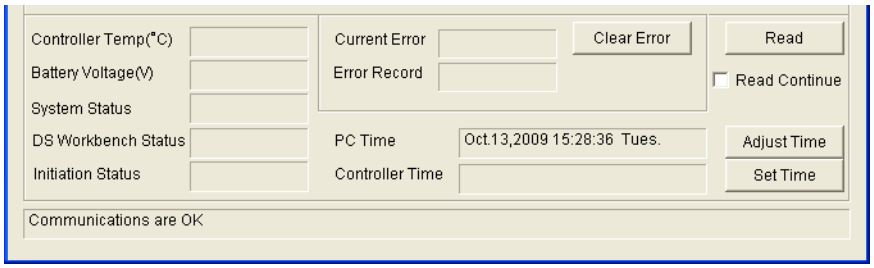


Battery Voltage

This is the battery voltage of the controller. When the battery voltage is lower than 2.0V, you need to replace the battery.



System Status



All the states of controller are showed by a 16-bit code. For details, see the following tables.

Error codes

Error Code	Meaning
0x0001	Hardware register error
0x0002	Data FLASH error
0x0100	HART communication error
0x0200	US1 communication error
0x0400	US2 communication error

If more than one error occurs, an "OR" operation will be performed on the codes. For example, if both US1 and US2 communication errors occur, the error code will be 0600. If all errors occur, the code will be 0703.

Initialization state codes

Initialization State Code	Meaning
0x0001	Test communication.
0x0002	Initialize communication parameters.
0x0004	Clear the DataSite Workbench application.
0x0008	Initialize registers.
0x0100	Initialize file system.
0x0200	Initialize DNP3.

If more than one initialization state exists, an "OR" operation will be performed on the codes. For example, a code of 0x0102 means that test communication and initialization of communication parameters are in progress.

DS Workbench Status codes

DS Workbench Status Code	Meaning
0001	DataSite Workbench is running.
0000	DataSite Workbench is stopped.

Clear Error Codes

Follow this step to clear the error codes of the controller.

- Click Clear Error

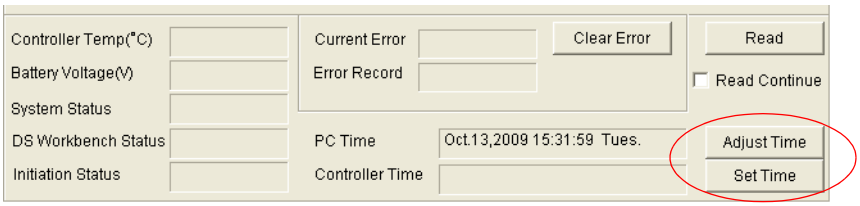
Adjust the System Time

There are two ways of adjusting the system time of the DataSite controller.

If you want to synchronize the controller time with the system time of the host computer to the DataSite controller, do the following.

- In the Debug dialog box, click Adjust Time.

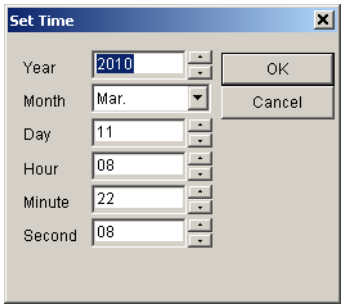
  The controller time will be synchronized with the PC Time.



If you need to set the controller time to a different value as the PC time, for example, when you need to debug the controller, do the following.

1. In the Debug dialog box, click Set Time.

   The Set Time dialog box appears.



2. Enter the date and time.
3. Click OK to write the new time into the controller.

Close the Controller Debug Dialog Box

Follow this step to close the Controller Debug dialog box.

- Click Exit.

Initialize the Controller

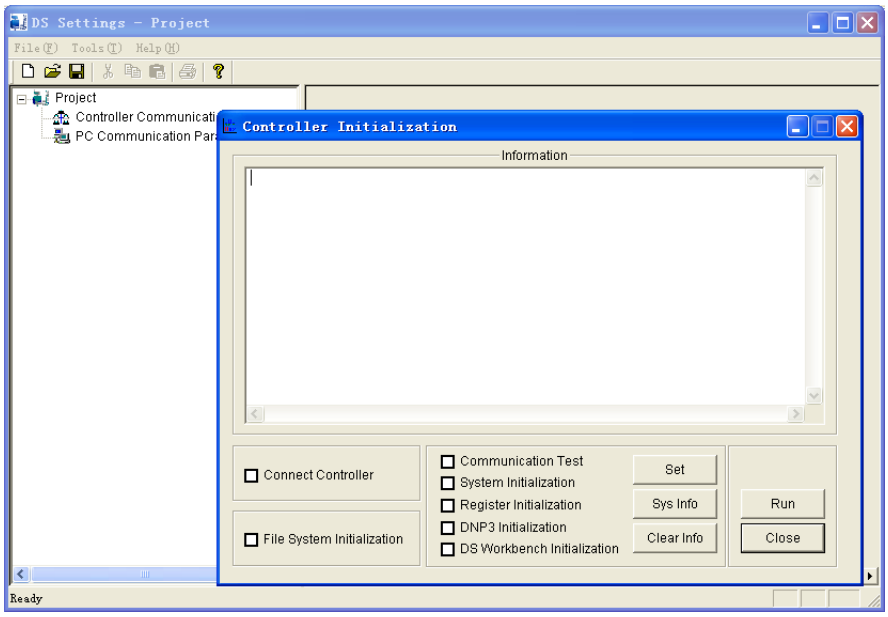
Use the Controller Initialize function to initialize the DataSite controller.

Open the Controller Initialize Dialog Box

Follow this step to open the Controller Initialize dialog box.

- From the Tools menu, choose Controller Initialize.

  The Controller Initialize dialog box appears.



Switch Controller into Service Mode

To initialize the controller, you must set the controller into the Service mode first.

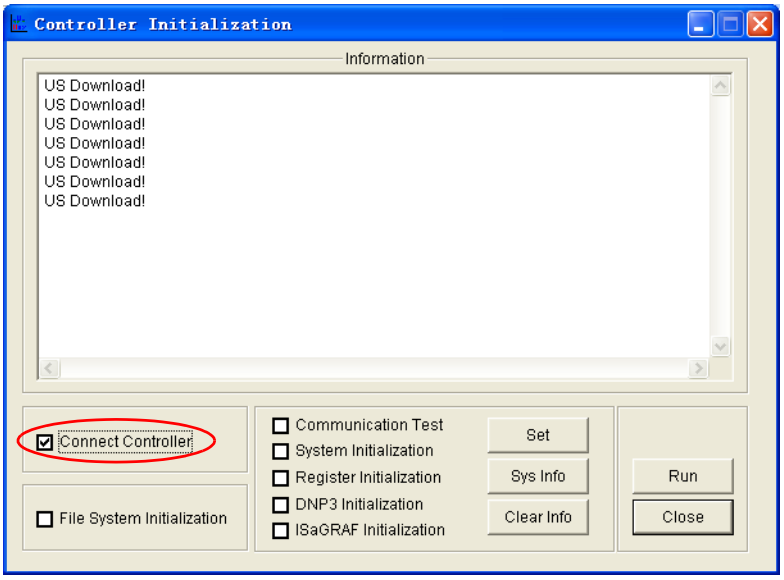
Follow these steps to set the controller into the Service mode.

1. Power down the DataSite controller.
2. Use a serial communication cable to connect one PC serial port with the COM2 of the controller.

IMPORTANT Only COM2 can be used.

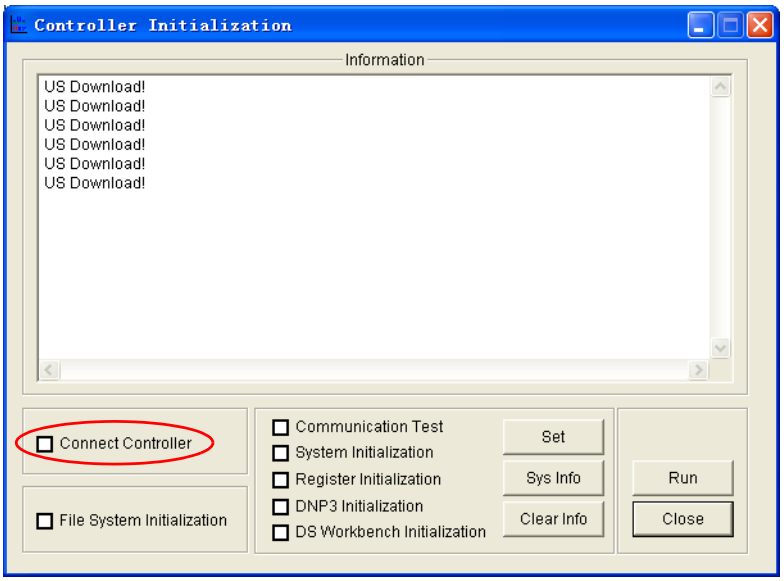
3. From the Tools menu, choose Controller Initialize.

4. Select the Connect Controller check box.



5. Power up the DataSite controller.

6. When "US Download!" appears in the Infomation box, clear the Connect Controller check box.



The DataSite controller has successfully gone into the Service mode.

Initialize DataSite Workbench

Follow these steps to clear DataSite Workbench in the DataSite controller.

1. Set the controller into the Service mode.
2. Select the DS Workbench Initialization check box.
3. Click Set.

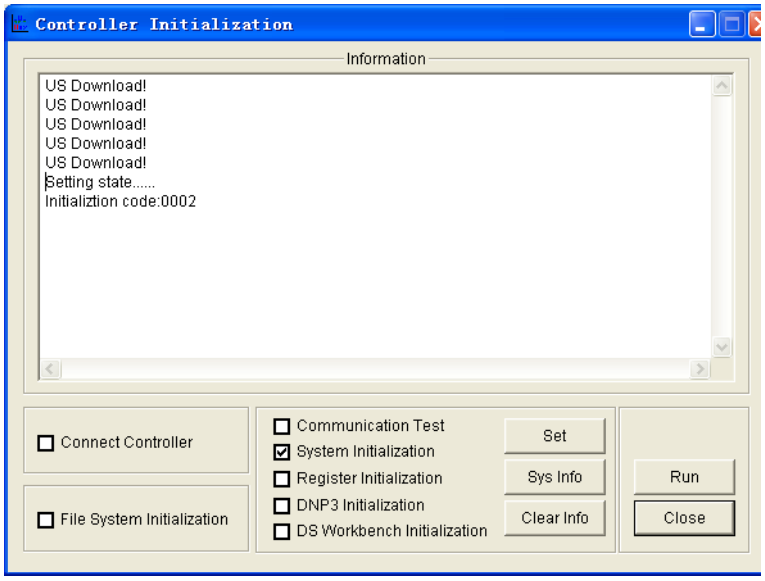
   All settings will be downloaded into the controller.
4. Click Run, and exit the local connection.

Reset the Controller Communication Parameters

Follow these steps to reset the controller communication parameters to their default values.

1. Set the controller into the Service mode.
2. Select the System Initialize check box.
3. Click Set.

   All settings will be downloaded into the controller.



4. Click Run, and exit the local connection.

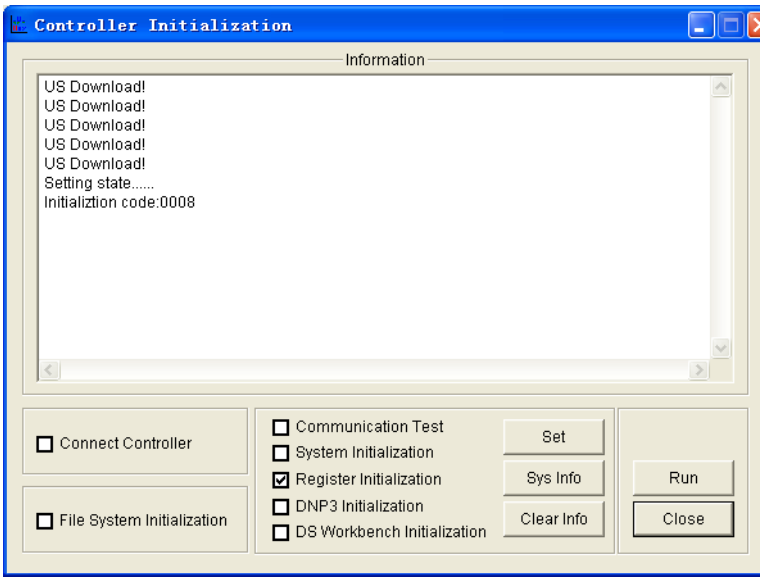
See Display the Default Settings on page 28 for the default values of the controller communication parameters.

Reset the Register Values

Follow these steps to reset the register values in the controller to 0.

1. Set the controller into the Service mode.
2. Select the Register Initialize check box.
3. Click Set.

   All settings will be downloaded into the controller.



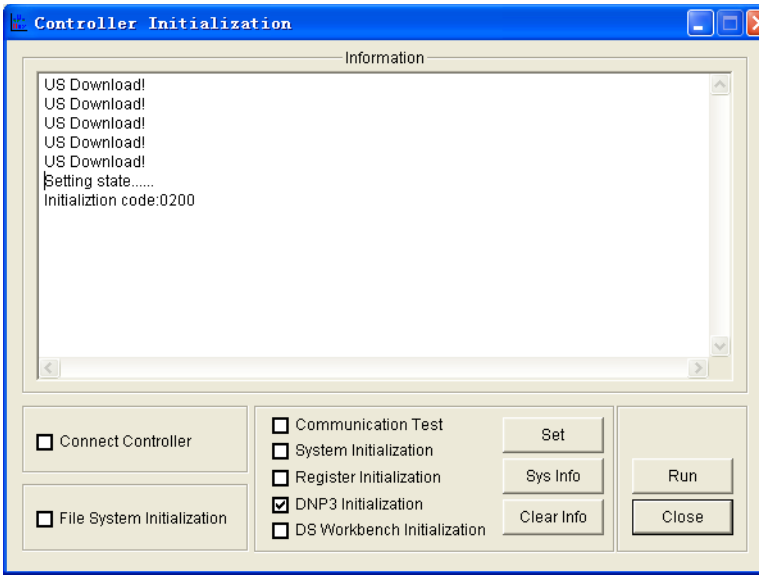
4. Click Run, and exit the local connection.

Reset the DNP3 Parameters

Follow these steps to reset all the DNP3 parameters to their default values.

1. Set the controller into the Service mode.
2. Select the DNP3 Initialize check box.
3. Click Set.

All settings will be downloaded into the controller.



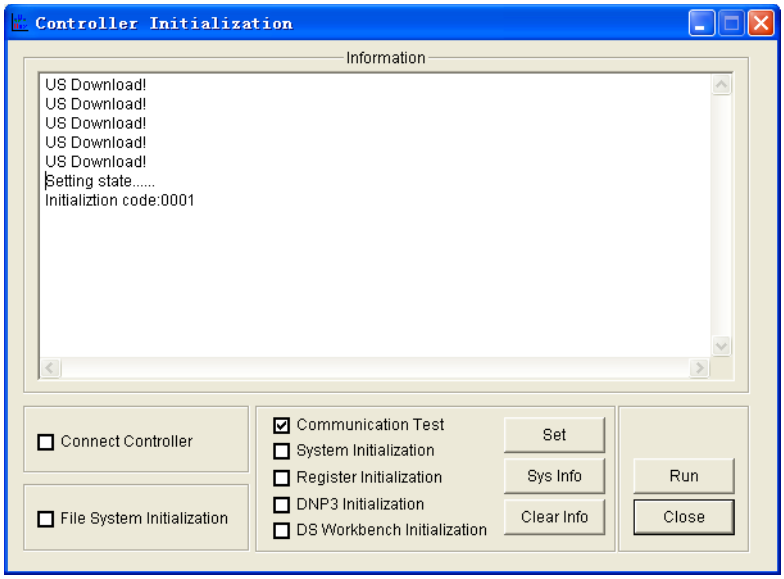
4. Click Run, and exit the local connection.

Test the Communication

Follow these steps to obtain the communication settings of the DataSite controller, such as baud rate of the serial port, and the IP address of the Ethernet port.

1. Set the controller into the Service mode.
2. Select the Communication Test check box.
3. Click Set.

   All settings will be downloaded into the controller.



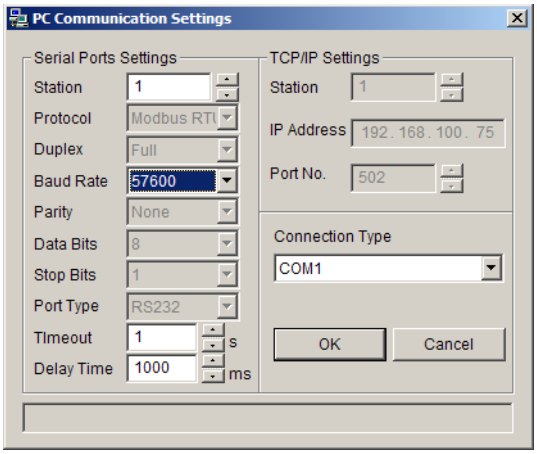
4. Click Run followed by Close.

   Here the communication parameters of COM2 are set to be test parameters. See this table.

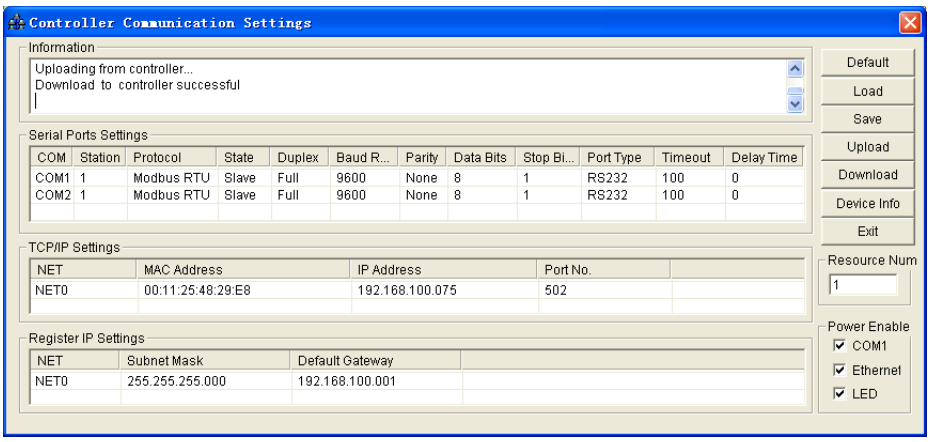
COM2 communication test parameters

Parameter name	Parameter value
Station	1
Protocol	Modbus RTU
Master/Slave state	Slave
Duplex	Full
Baud rate (bps)	57600
Parity	None
Data bits	8
Stop bits	1
Port type	RS232
Timeout (10 ms)	100
Delay time (10 ms)	0

5. Start DS Settings, and choose PC Communication Settings from the Tools menu. Set the PC baud rate as 57600.



6. From the Tools menu, choose Controller Communication Settings.



When the upload is successfully completed, the communication settings of controller are displayed.

7. To exit the Communication Test state, power down the DataSite controller and then power it up again.

Initialize the File System

The File System Initialization option lets you do the following:

- Clear all the parameter settings made in DS Settings, for example, Scan block, HART scan block and PID block settings.
- Clear DNP3 settings
- Clear registers

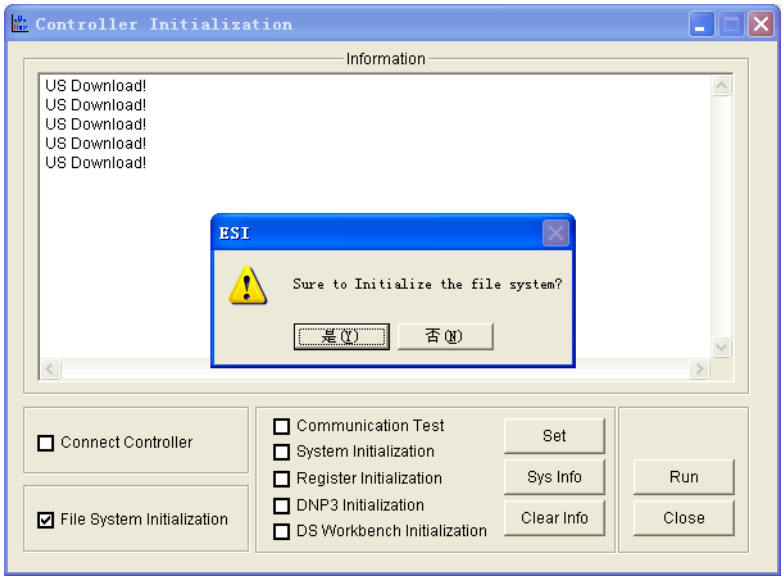
This is equivalent to selecting the following check boxes:

- Register Initialization
- DNP3 Initialization
- DS Workbench inititialization

Follow these steps to initialize the file system.

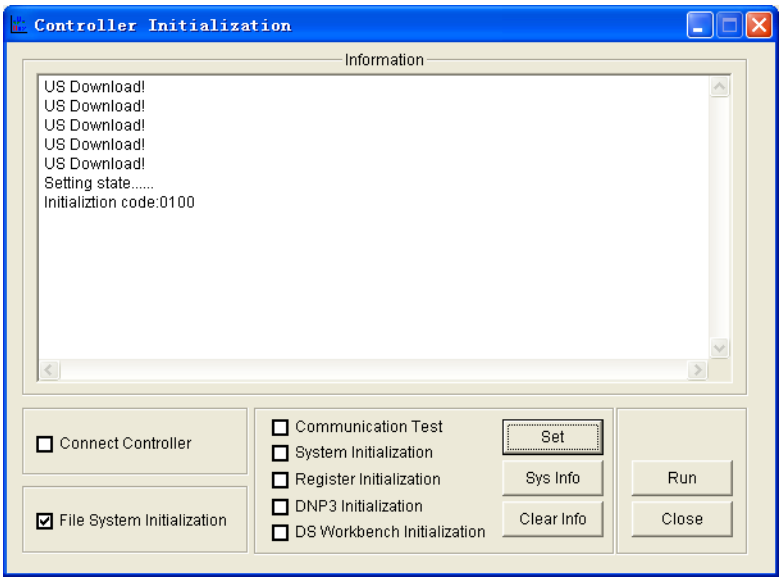
1. Set the controller into the Service mode.
2. Select the File System Initialize check box.

   A dialog box appears, prompting you to confirm the initialization.



3. Click Yes.

Status messages corresponding to the file initialization appear in the Information box.



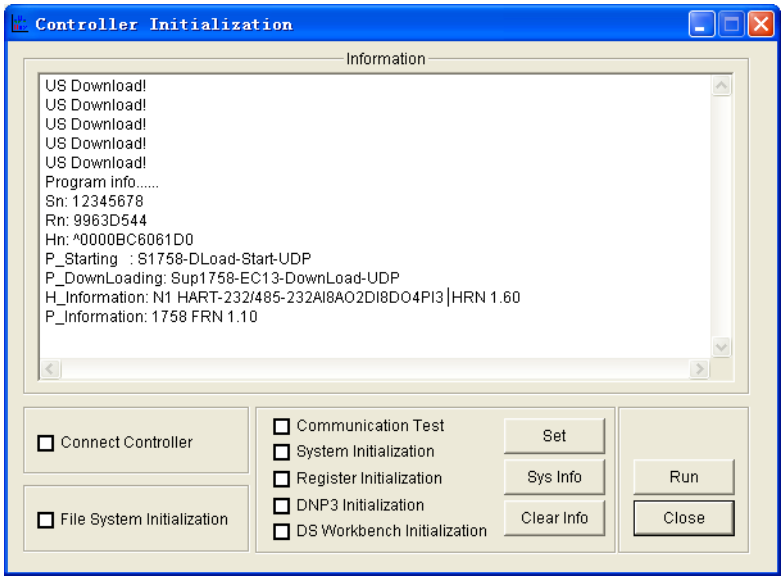
4. Click Run, and exit the local connection.

Display System Information

Follow these steps to display the basic factory information on the DataSite controller.

1. Set the controller into the Service mode.
2. Click Sys Info.

   Basic factory information on the DataSite controller appears in the Information box.



This table provides a description of the system information that is displayed.

System information

Information Item	Description
Sn	Unique serial number of the DataSite controller.
Rn	Unique registration number for the DataSite controller.
Hn	MAC ID for the DataSite controller. The format is "^xx xx xx xx xx xx" where xx represents hexadecimal numbers.
P_Starting	Name of the boot loader application.
P_Downloading	Name of the downloader application which is used to write the downloaded application into the flash chip.

System information

Information Item	Description
H_Information	Hardware information of the DataSite controller. This includes the I/O channels (AI, AO, DI, DO, and PI), and communication interfaces such as RS232, RS485, and Ethernet. The hardware version number is represented by "HRN".
P_Information	Firmware version, such as FRN 1.10.

3. Click Run, and exit the local connection.

Clear the Status Messages

Follow this step to clear all the messages in the Information box.

- Click Clear Info.

Allocate Registers

Module internal registers are divided into four types:

- Coil_Register
- State_Register
- Input_Register
- Hold_Register

Coil_Register and State_Register are single-bit registers. Every register address corresponds to a binary bit.

Input_Register and Hold_Register are 16-bit registers.

Modbus addresses of internal registers

Register name	Modbus address	Features
Coil_Register	00001-04096	1-bit
State_Register	10001-14096	1-bit
Input_Register	30001-31024	16-bit
Hold_Register	40001-49999	16-bit

Read and Write Registers

Internal registers of the DataSite controller can be read and written via the Controller Debug tool in DS Settings. For details, see Debug the Controller Programs on page 83.

By configuring scan blocks, you can set internal registers of other devices to be read into the DataSite controller. After that, you can read and write these registers via the Controller Debug dialog box in the DS Settings tool. For methods of configuring scan blocks, see Settings on page 35.

Modbus Register for Signals

This table lists the Modbus registers and their data types, Modbus addresses and attributes.

Name	Data Type	Modbus Address	Attribute
DI0	BOOL	10001	Read-only
DI1	BOOL	10002	Read-only
DI2	BOOL	10003	Read-only
DI3	BOOL	10004	Read-only
DI4	BOOL	10005	Read-only
DI5	BOOL	10006	Read-only
DI6	BOOL	10007	Read-only
DI7	BOOL	10008	Read-only
DI8	BOOL	10009	Read-only
DI9	BOOL	10010	Read-only
DI10	BOOL	10011	Read-only
DO0	BOOL	00001	Read/write
DO1	BOOL	00002	Read/write
DO2	BOOL	00003	Read/write
DO3	BOOL	00004	Read/write
AI0	U_SHORT	30001	Read-only
AI1	U_SHORT	30002	Read-only
AI2	U_SHORT	30003	Read-only
AI3	U_SHORT	30004	Read-only
AI4	U_SHORT	30005	Read-only
AI5	U_SHORT	30006	Read-only
AI6	U_SHORT	30007	Read-only
AI7	U_SHORT	30008	Read-only
AO0	U_SHORT	40001	Read/write
AO1	U_SHORT	40002	Read/write
PI0	U_INT	30011...30012	Read-only
PI1	U_INT	30013...30014	Read-only
PI2	U_INT	30015...30016	Read-only

Value in Registers State

The values in the DI, DO, AI, AO, and PI registers are not saved when the DataSite controller powers down. When the DataSite controller powers up, the DI, AI, and PI registers will receive actual values from the input signals, DI, AI, and PI but the values in the DO, AO, and PI registers will be cleared to zero.

If you configure some scan blocks or HART blocks, the values in the Master Registers of all the blocks will remain at the last saved values before communication failed. So you need to use the relevant function block to check the communication status to determine whether the value is valid. You can write a program in DataSite Workbench to read the current communication status, and then save the status into a Modbus register as an indicator to be used by other programs.

For the list of function blocks you can use, refer to DataSite Customized Function Blocks Reference Manual, publication 1758-RM001.

DataSite Flow Configuration Utility (DS FloConfig)

This chapter provides information on the configuration settings utility, DS FloConfig.

IMPORTANT Use this tool to configure the 1758-FLO DataSite controllers only.

Introduction

DS FloConfig is a configuration software for 1758-FLO DataSite controllers.

You can edit and modify parameters for the flow computer, such as AGA3/AGA7 algorithm selection, AGA3/AGA7 process parameters, and AGA8 parameters.

DS FloConfig software can display real-time measurement data of each meter run. You can also view and search historical transaction records and event records. The parameter configuration can be saved into a project file for ease of use.

Hardware and Software Requirements

To install DS FloConfig, you need the following:

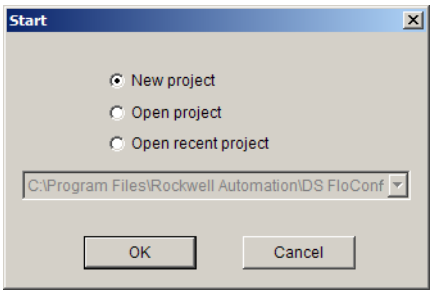
- An IBM-compatible PC with at least a 80486 microprocessor (Pentium-166 and above),
- a CD-ROM drive,
- at least 70 MB of free hard disk space,
- at least 32 MB of memory (64 MB recommended),
- A VGA graphic card, and
- Windows NT 4.0, Windows 2000, or Windows XP Professional.

Start DS FloConfig

Follow these steps to start DS FloConfig.

1. Start Microsoft Windows.
2. Click Start > Programs > Rockwell Software > DataSite Products > DataSite Tools > DS FloConfig.

   The Start dialog box appears.

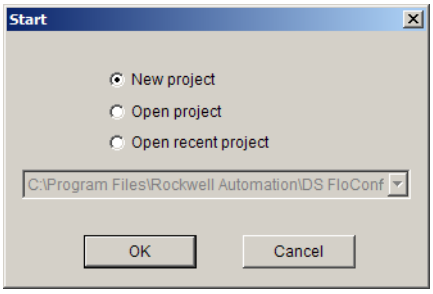


3. For instructions on how to create a new project, see Create a New Project File.
   For instructions on how to open an existing project, see Open a Project File.
   For instructions on how to open a recent project, see Open a Recent Project File.

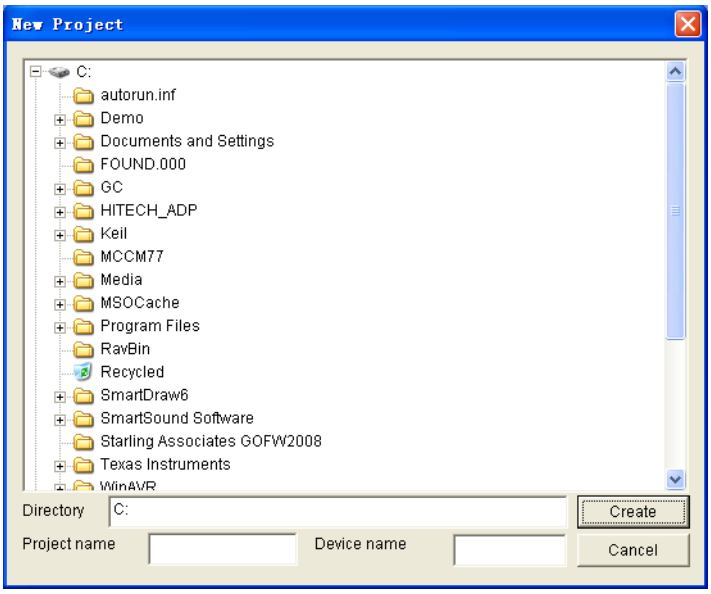
Create a New Project File

Follow these steps to create a new project file.

1. In the Start dialog box, click New Project followed by OK.



The New Project dialog box appears.



2. In the Directory box, enter the location you want to store the new project file in.
   Alternatively, use the tree structure to browse to the desired location.

3. In the Project Name box, enter a name for the project file.

4. In the Device Name box, enter a name for the device.
   The length of the name cannot exceed eight characters.

5. Click Create.

   A new project file is created in the location you specified and the DS FloConfig window appears.

TIP

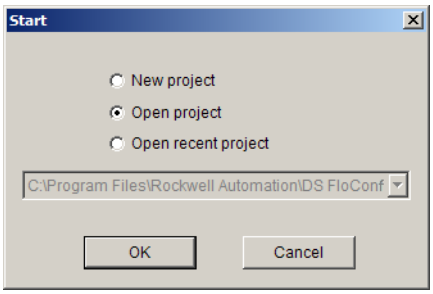
After the DS FloConfig window appears, you may also create a new project file by:

- choosing New from the File menu, or
- clicking the New button 🗋 on the toolbar.

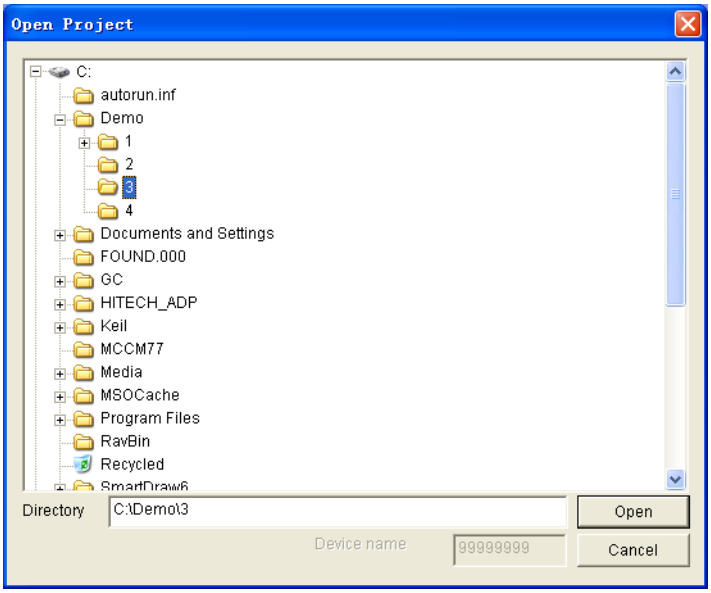
Open a Project File

Follow these steps to open an existing project file.

1. In the Start dialog box, click Open Project followed by OK.



The Open Project dialog box appears.



2. In the Directory box, enter the location of the desired project file. Alternatively, use the tree structure to browse to the location.

3. Click Open.

The selected project file is open in the DS FloConfig window.

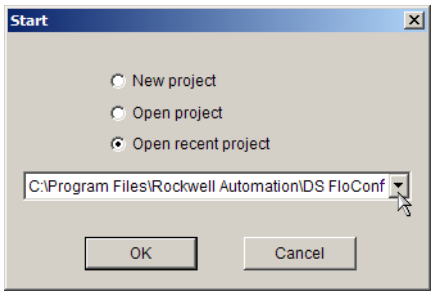
TIP After the DS FloConfig window appears, you may also open a project file by:

- choosing Open from the File menu, or
- clicking the Open button on the toolbar.

Open a Recent Project File

Follow these steps to open a recent project.

1. In the Start dialog box, click Open Recent Project.



2. From the list of recent project files, select the project file you want to open.
3. Click OK.

   The selected project file is open in the DS FloConfig window.

Close DS FloConfig

Follow this step to close DS FloConfig.

- From the File menu, choose Exit.

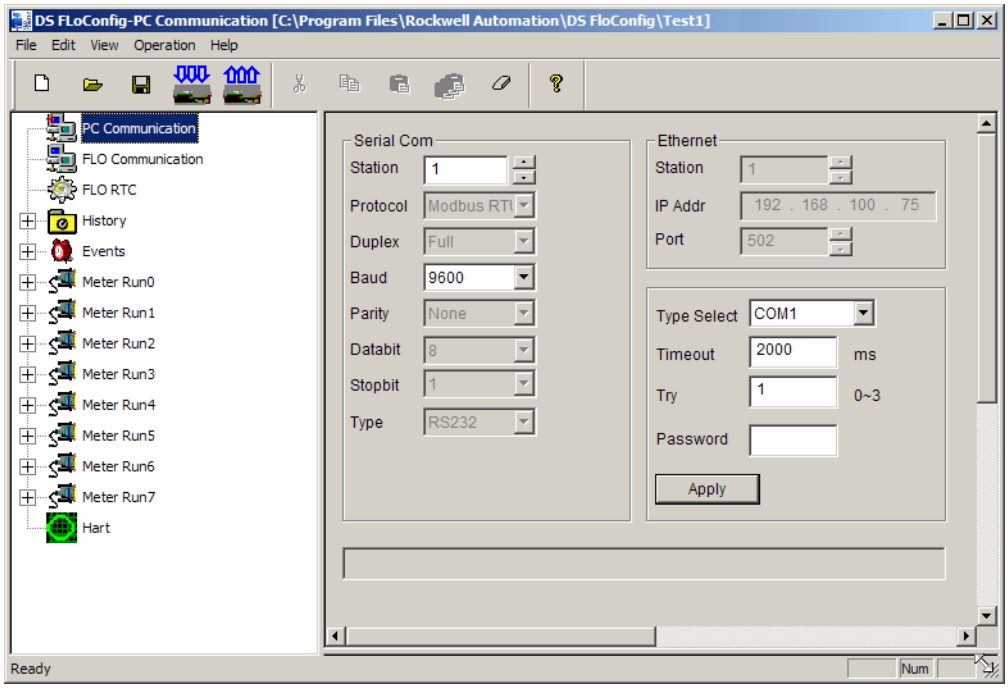
Configure PC Communication Settings

The DataSite controller can be connected to the PC via the serial port or the Ethernet (TCP/IP) port. Use PC Communication settings to set up the communication mode and parameters for this connection.

Open the PC Communication Dialog Box

Follow this step to open the PC Communication dialog box.

- In the configuration tree, click PC Communication.



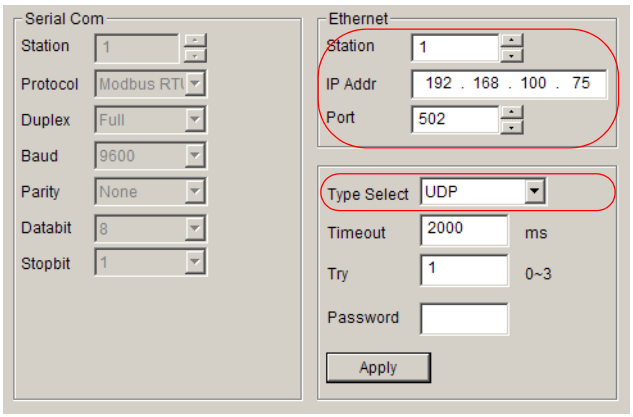
Set Up PC Communication

Follow these steps to set up the PC communication.

1. From the Type Select pull-down menu, choose the type of communication port used between the PC and the DataSite controller:

   - For Ethernet communication mode, choose UDP.
   - For Serial port communication mode, choose one of the COM ports (COM1…COM10).

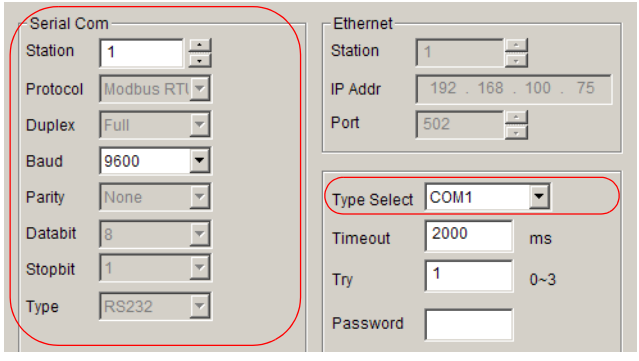
2. If you have chosen UDP, set up the parameters for the TCP/IP connection.



Parameters for TCP/IP communication

Parameter	Description	Default Value
Station number	Station corresponding to the DataSite controller communication Ethernet port.	1
IP address	IP address corresponding to the Ethernet communication port of the DataSite controller. The address is in the format, xxx.xxx.xxx.xxx, made up of four octets with each octet ranging between 0 and 255.	192.168.100.75
Port no.	Port corresponding to the DataSite controller.	502

3. If you have chosen a COM port, set up the parameters for the serial port connection.



Parameters for serial port communication

Parameter	Value range	Default Value
Station number	1…247	1
Baud rate (bps)	2400, 4800, 9600, 14400, 19200, 38400, 56000, 57600	9600

4. In the Timeout box, enter in milliseconds, the timeout duration for the communication response to be received from the DataSite controller.

5. In the Try box, enter the maximum number of attempts for the computer to connect to the DataSite controller.

6. Enter a password in the Password box.

   This password is required for successful communication between the computer and the DataSite controller, for example when setting and saving parameter configurations.

   The factory default setting for the password is 0000.

TIP The factory default setting for the password in DataSite is blank. This means you can enter any code in the Password box to communicate with the DataSite controller.

IMPORTANT To protect the configuration on the DataSite controller, it is important to change the password. Without the password, information can still be uploaded from the controller, but downloads to the controller are forbidden.

For instructions on how to change the password, see Change the Communication Password.

7. Click Apply.

   The new settings are applied.

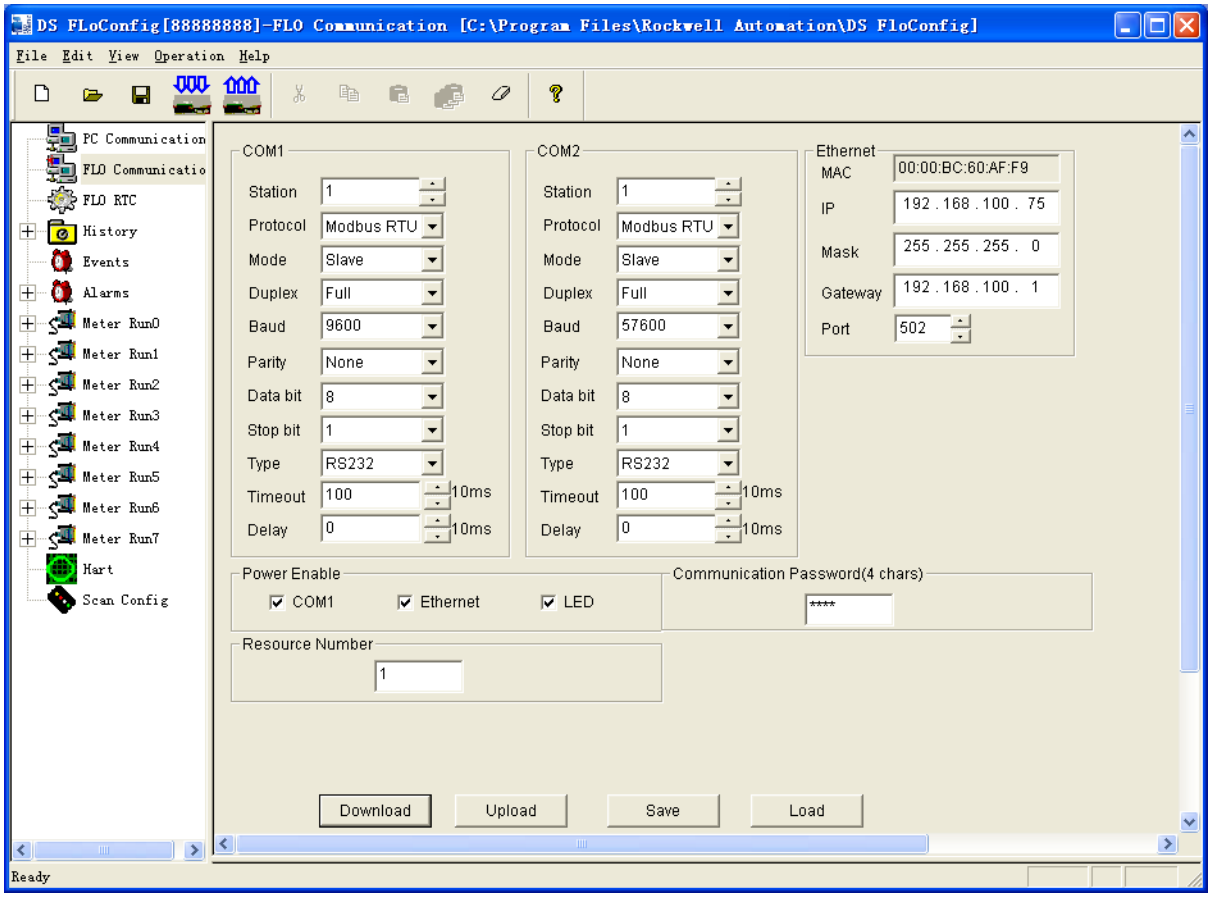
Configure FLO Communication Settings

Use FLO Communication settings to set controller parameters, such as serial port parameters or Ethernet parameters, and low-power settings in the sleep mode of the controller.

Open the FLO Communication Dialog Box

Follow this step to open the FLO Communication dialog box.

- In the configuration tree, click FLO Communication.



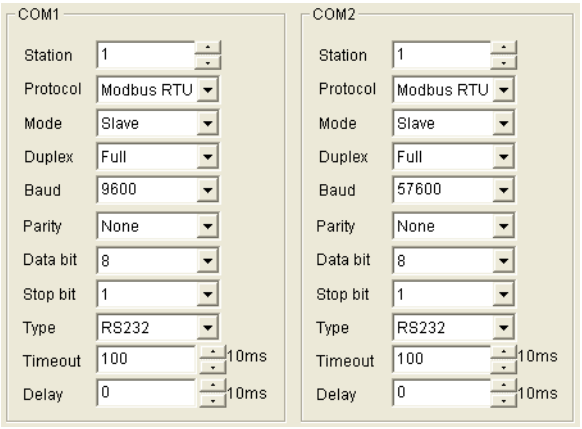
Configure Serial Port Settings

Each 1758-FLO DataSite controller has one RS232/RS485 combo port (COM1, default as RS232), and one RS232 port (COM2).

The default baud rate of each serial port is 9600 bps and the default station number is 1.

Follow these steps to change the settings of the serial ports.

1. In the FLO Communication dialog box, set up the parameters for the serial ports.



This table shows the options and/or value range available for each parameter.

Serial port parameters

Parameter	Parameter Options or Value Range
Station	1…247
Protocol	DS Workbench (for COM2 only), Modbus RTU, Modbus ASCII, None
Mode	Master, Slave
Duplex	Full, Half
Baud	2400, 4800, 9600, 14400, 19200, 38400, 56000, 57600
Parity	Even, Odd, None
Data bit	7, 8
Stop bit	1, 2
Type	RS232, RS485
Timeout (in units of 10 ms)	1…1000
Delay (in units of 10 ms)	0…300

2. In the Communication Password box, enter the password you have previously set.

3. Click Download.

   The new settings are applied to the DataSite controller.

The following sections provide more information on some of the parameters for the serial port.

Master/Slave State

The serial port scan block (see the Configuration Example on page 50 can be configured in the master state to acquire data from the slave serial communication equipment connected in a certain time interval. In the slave state, the 1758 controller can receive commands from superior communication equipment, generate and return response message.

TIP When there are no protocol settings, the master state is invalid.

Timeout

In the master state, timeout is the maximum length of waiting time after a command is sent. No new commands are sent while waiting for a response. If no response is received after timeout, an error message box will be displayed to inform user. User will then be prompted to send a new command.

Timeout is not applicable in other states.

Delay Time

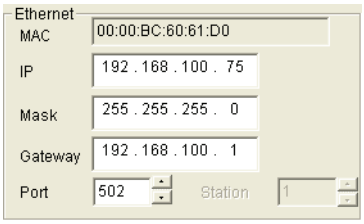
In the master state, delay time is the length of time that must be waited for the next sending after one sending/receiving is completed. The time settings can prevent communication error due to slower response of the lower communication equipment connected.

In the slave state, delay time is the time that must be waited for the response to be returned after a command is received. The time settings can prevent communication error due to slower response of the upper communication equipment.

Configure TCP/IP Settings

Follow these steps to configure the Ethernet port.

1. Under Ethernet in the FLO Communication dialog box, set up the parameters of the Ethernet port.



This table shows the value range for each parameter.

TCP/IP port parameters

Parameter	Parameter Value Range
MAC	xx:xx:xx:xx:xx:xx 6 integers in hexadecimal format. For example, 00:00:BC:60:61:D0. The MAC address is read-only.
IP	xxx.xxx.xxx.xxx 4 octets with each octet ranging from 0…255. The default value is 192.168.100.75.
Mask	xxx.xxx.xxx.xxx 4 octets with each octet ranging from 0…255.
Gateway	xxx.xxx.xxx.xxx 4 octets with each octet ranging from 0…255.
Port	502 The port number of DS Settings TCP/IP port is defined as 502 when the PC is connected to the DataSite controller.
Station	1 The default value is 1.

2. In the Communication Password box, enter the password you have previously set in the PC Communication dialog box. See Change the Communication Password on page 120.

3. Click Download.

   The new settings are applied to the DataSite controller.

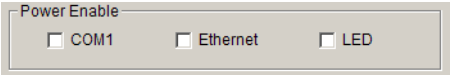
Lower Power Consumption

The options in the Power Enable group allow you to shut the power supply to some parts of the DataSite controller to lower power consumption.

Follow these steps to lower power consumption.

1. Under Power Enable in the FLO Communication dialog box, clear the check boxes for the parts that can go to sleep:

   - COM1 port
   - Ethernet port
   - LED indicators



IMPORTANT If you are still using a port, do not clear its check box under Power Enable. Otherwise, communication may be interrupted. For example, when the DataSite controller is communicating via the Ethernet port, do not shut the power supply of the Ethernet port.

2. Click Download.

   The settings are applied to the DataSite controller.

Set the Resource Number (Optional)

The resource number is required by DataSite Workbench and DataSite Screen Builder to identify resources when the DataSite controller is binding with other controllers. Each controller should have a unique resource number in the binding group. For details on the resource number, refer to the DataSite Workbench User's Guide.

Follow these steps to set the resource number.

1. In the Resource Number box, enter an integer for a resource.

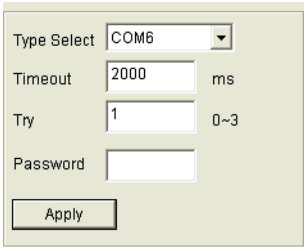
2. Click Download.

   The setting is applied to the DataSite controller.

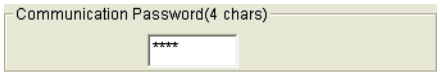
Change the Communication Password

Follow these steps to change the communication password.

1. Open the PC Communication tree.
2. In the Password box, enter the old password and then click Apply.



3. Open the FLO Communication tree.
4. In the Communication Password box, enter the new password.



5. Click Download.

   The new password is saved to the DataSite controller.

TIP You can enter any password when uploading settings from the DataSite controller. The correct password, however, is required before you can download settings to the DataSite controller.

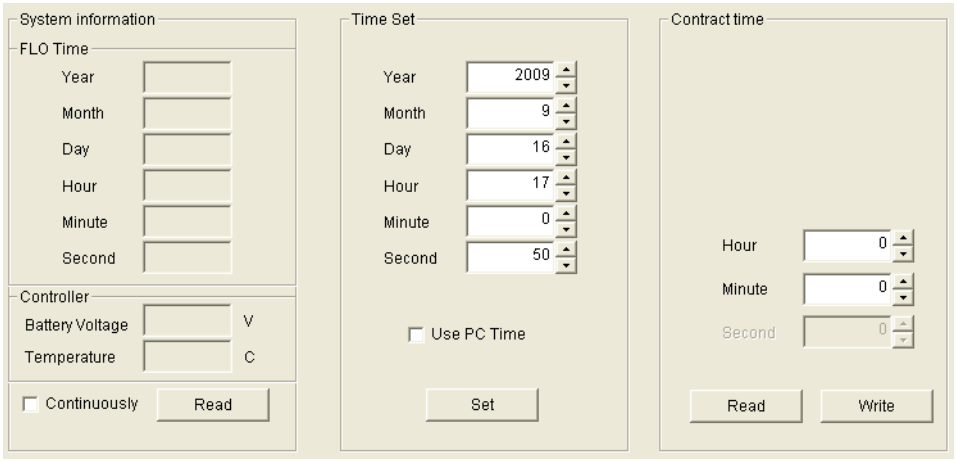
Configure FLO RTC Settings

The FLO RTC settings allow you to read the real-time clock (RTC) of the DataSite controller, calibrate the RTC, and set the contract time.

Open the FLO RTC Dialog Box

Follow this step to open the FLO RTC dialog box.

- In the configuration tree, click FLO RTC.



Read the Real-Time Clock

Follow these steps to read the RTC.

1. Under FLO Time, if you want the time to be read continuously, select the Continuously check box.
2. Under FLO Time, click Read.

The current date and time of the RTC appears.



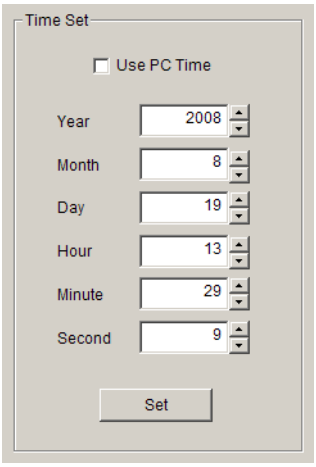
Calibrate the Real-Time Clock (RTC)

Follow these steps to calibrate the RTC.

1. Under Time Set, enter the date and time in the corresponding boxes. You can also use the current PC time by selecting the Use PC Time check box.

2. Under Time Set, click Set.

   The RTC is set to the date and time entered.



TIP You should calibrate the RTC after initializing the DataSite controller.

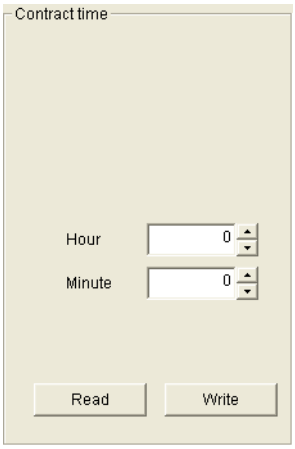
Set the Contract Time

Contract time is the start time in a contract day. This is when the DataSite controller starts taking and recording measurements.

The default contract time is 8:0:0.

Follow this step to display the current contract time.

- Under Contract Time, click Read.



Follow these steps to set the contract time.

1. Under Contract Time, enter the desired contract time in the Hour and Minute boxes. For example, if you want to set 7.30 a.m. as the new contract time, enter "7" in the Hour box and "30" in the Minute box. The value of seconds is not editable and the default value is 0.

2. Under Contract Time, click Write.

   The new contract time is applied to the DataSite controller.

Record Flow Results for a Meter Run

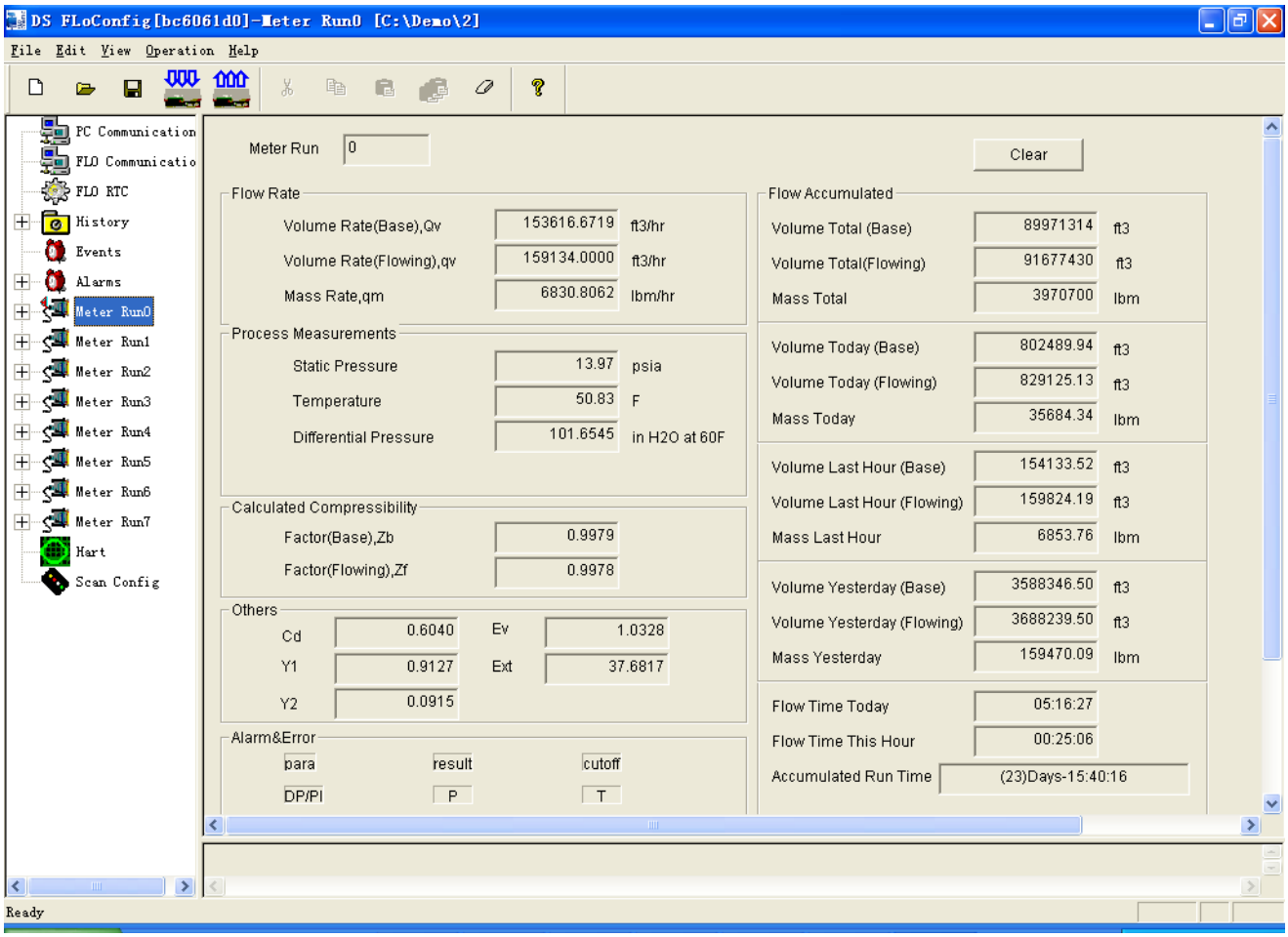
DS FloConfig can record and display the flow results for up to eight meter runs.

Display the Flow Results of a Meter Run

Follow this step to display the flow results of a meter run.

- Click the meter run in the configuration tree.

For example, if you want to display the flow results for Meter Run 0, click Meter Run0 as shown in the following diagram.



Meter Run

This is the meter run number.

Flow Rate

These are the measurements for gas flow rate.

- Volume Rate (Base)

  Volume transient flow rate (ft3/hour) at base conditions. For information on settings for the base pressure and temperature, see Instrument Parameters for AGA3 Standard on page 137 and Instrument Parameters for AGA7 Standard on page 139.

- Volume Rate (Flowing)

  Volume transient flow rate (ft3/hour) at flowing conditions. Flowing conditions means the actual pressure and temperature.

- Mass Rate

  Mass transient flow rate (lbm/hour).

Process Measurements

These are the process measurements:

- Static Pressure

  Absolute or gauge, depending on the static pressure type settings in Instrument Parameters for AGA3 Standard on page 137 and Instrument Parameters for AGA7 Standard on page 139.

- Temperature

  Temperature of the fluid while it is flowing.

- Differential Pressure (for AGA3)

  Difference between the pressure at the upstream and the pressure at the downstream.

- Pulse (for AGA7)

  Pulse count accumulated in a second.

Flow Accumulated

These are the measurements for the total accumulated gas flow.

- Volume Total (Base)

  The accumulated volume flow under base conditions from the first running point to the current time, accumulated once every second.

- Volume Total (Flowing)

  The accumulated volume flow under flowing conditions from the first running point to the current time, accumulated once every second.

- Mass Total

  The accumulated mass flow from the first running point to the current time, accumulated once every second.

These are the measurements for the gas flow on the current day.

- Volume Today (Base)

  The accumulated volume flow under base conditions from today's starting point (Contract Hour) to now, accumulated once every second. Reset to zero at each contract day start point (Contract Hour).

- Volume Today (Flowing)

  The accumulated volume flow under flowing conditions from today's starting point (Contract Hour) to now, accumulated once every second. Reset to zero at each contract day start point (Contract Hour).

- Mass Today

  The accumulated mass flow from today's starting point (Contract Hour) to now, accumulated once every second. Reset to zero at each contract day start point (Contract Hour).

These are the measurements for the gas flow in the last hour.

- Volume Last Hour (Base)

  The accumulated volume flow under base conditions during last hour. Updated at each hour point.

- Volume Last Hour (Flowing)

  The accumulated volume flow under flowing conditions during last hour. Updated at each hour point.

- Mass Last Hour

  The accumulated mass flow during last hour. Updated at each hour point.

These are the measurements for the gas flow on the previous day.

- Volume Yesterday (Base)

  The accumulated volume flow under base conditions during the previous contract day. Updated at each Contract Hour.

- Volume Yesterday (Flowing)

  The accumulated volume flow under flowing conditions during the previous contract day. Updated each Contract Hour.

- Mass Yesterday

  The accumulated mass flow during the previous contract day. Updated each Contract Hour.

These are the measurements for flow time and run time.

- Flow Time Today

  The accumulated running time of the meter in normal operating state from today's starting point (Contract Hour) to the present. It is less than or equal to 24 hours. Display format is, hour: minute: second.

- Flow Time This Hour

  The accumulated running time of the meter in normal operating state in this hour. It is less than or equal to 60 minutes. Display format is, hour: minute: second.

- Accumulated Run Time

  The length of time the flow meter has run, from the time you start the accumulation, up to the current time.

TIP For instructions on how to set the contract time, see Set the Contract Time on page 123.

IMPORTANT Normal operating state means the meter is enabled and accumulating. Please see Enable a Meter Channel and Its Accumulation Calculation on page 135.

Calculated Compressibility

These are the compressibility factors at base conditions and flowing conditions as calculated by AGA8.

- Factor (Base)
- Factor (Flowing)

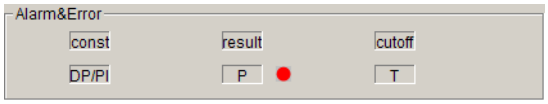
Error and Alarm State Display

Under Alarm&Error in the Meter Run dialog box, there are six alarms or errors listed. This table provides the description for each item.

Alarms and errors

Item	Description
Para	There is an error from the input of flow parameters.
Result	There is a flow rate calculation error.
Cutoff	There is a low flow cutoff of the orifice plate or the turbine.
DP/PI	The differential pressure or pulse input is outside of alarm limits, either higher or lower. This alarm is active only if this item is set as a variable in an alarm event.
P	The pressure input is outside of alarm limits, either higher or lower. This alarm is active only if this item is set as a variable in an alarm event.
T	The temperature input is outside of alarm limits, either higher or lower. This alarm is active only if this item is set as a variable in an alarm event.

If an item has an error or has triggered an alarm event, a red dot will appear next to the item.



For the alarms that have been configured, all the historical and current state alarms will be recorded in the event records. For instructions on configuring alarm events, see Configure Alarm Events.

Clear Accumulation

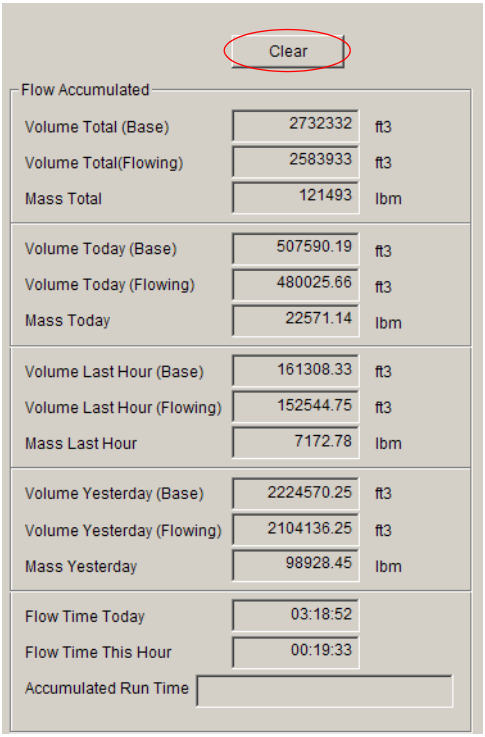
Follow these steps to clear the value of all the accumulated variables of a meter.

IMPORTANT There is no Undo for the Clear function. Use this function cautiously.

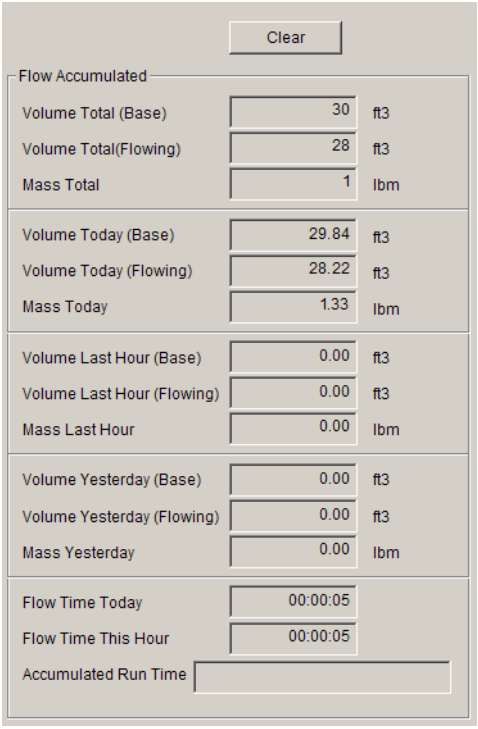
1. In the configuration tree, click the Meter Run item for the meter you want.

   The Meter Run dialog box for that meter appears.

2. Click Clear.


Clear
Flow Accumulated
Volume Total (Base) 2732332 ft3
Volume Total(Flowing) 2583933 ft3
Mass Total 121493 lbm
Volume Today (Base) 507590.19 ft3
Volume Today (Flowing) 480025.66 ft3
Mass Today 22571.14 lbm
Volume Last Hour (Base) 161308.33 ft3
Volume Last Hour (Flowing) 152544.75 ft3
Mass Last Hour 7172.78 lbm
Volume Yesterday (Base) 2224570.25 ft3
Volume Yesterday (Flowing) 2104136.25 ft3
Mass Yesterday 98928.45 lbm
Flow Time Today 03:18:52
Flow Time This Hour 00:19:33
Accumulated Run Time

All the accumulated variables will be reset to 0, similar to the following figure.

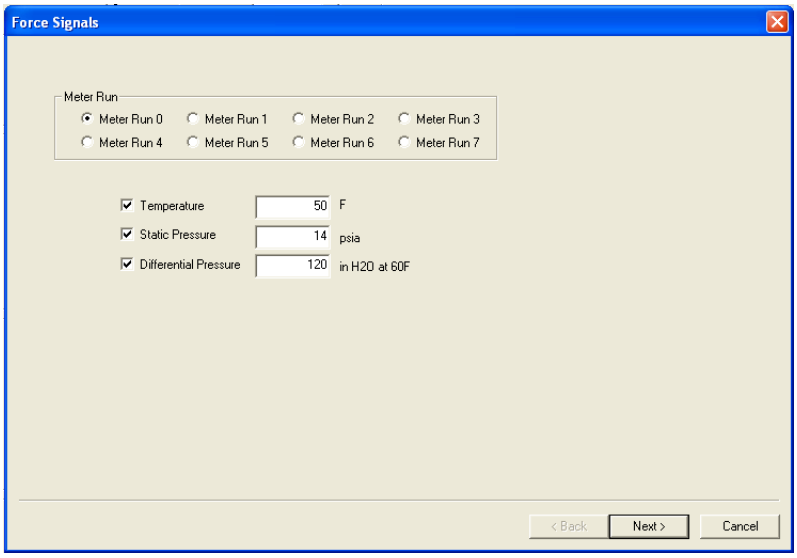


Perform a Flow Calculation Test

Calculation Test means the flow computer will not use the measured DP/P/T/PI signals from field. Instead it will use the simulation forced values you set to calculate the flow rate. You can use this function to verify the flow calculation precision, and also can use it to do sensor calibration.

Follow these steps to perform a flow calculation test.

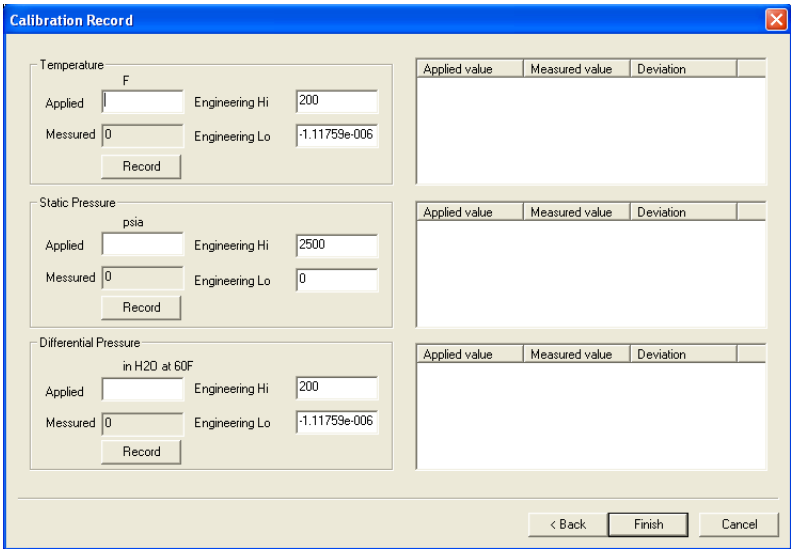
1. On the Operation menu, click Meter Calibration.



2. Select the meter run and enter the forced values.

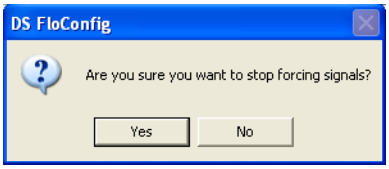
3. Click Next.

   The following dialog box appears.



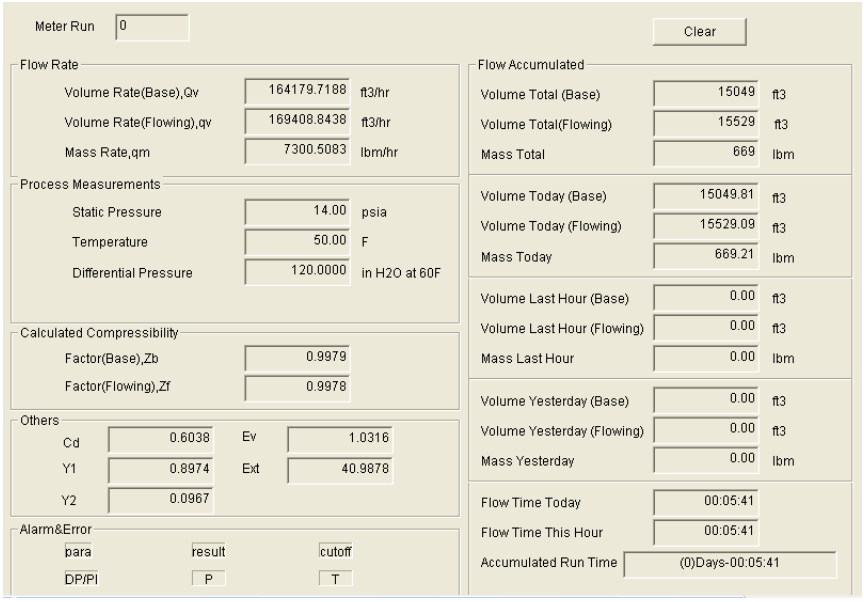
4. Click Finish.

   The following dialog box appears.



5. Click No followed by OK.

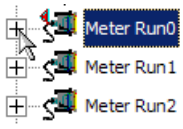
   The flow meter will calculate the flow according to these values of T, P, and DP/PI.



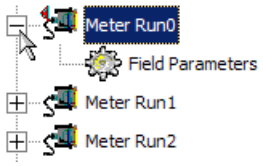
Display the Field Parameters of a Meter Run

Follow these steps to display the field parameters of a meter run.

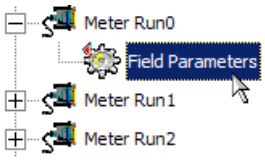
1. In the configuration tree, click the "+" symbol for the desired meter run. Meter Run0 is used as an example here.



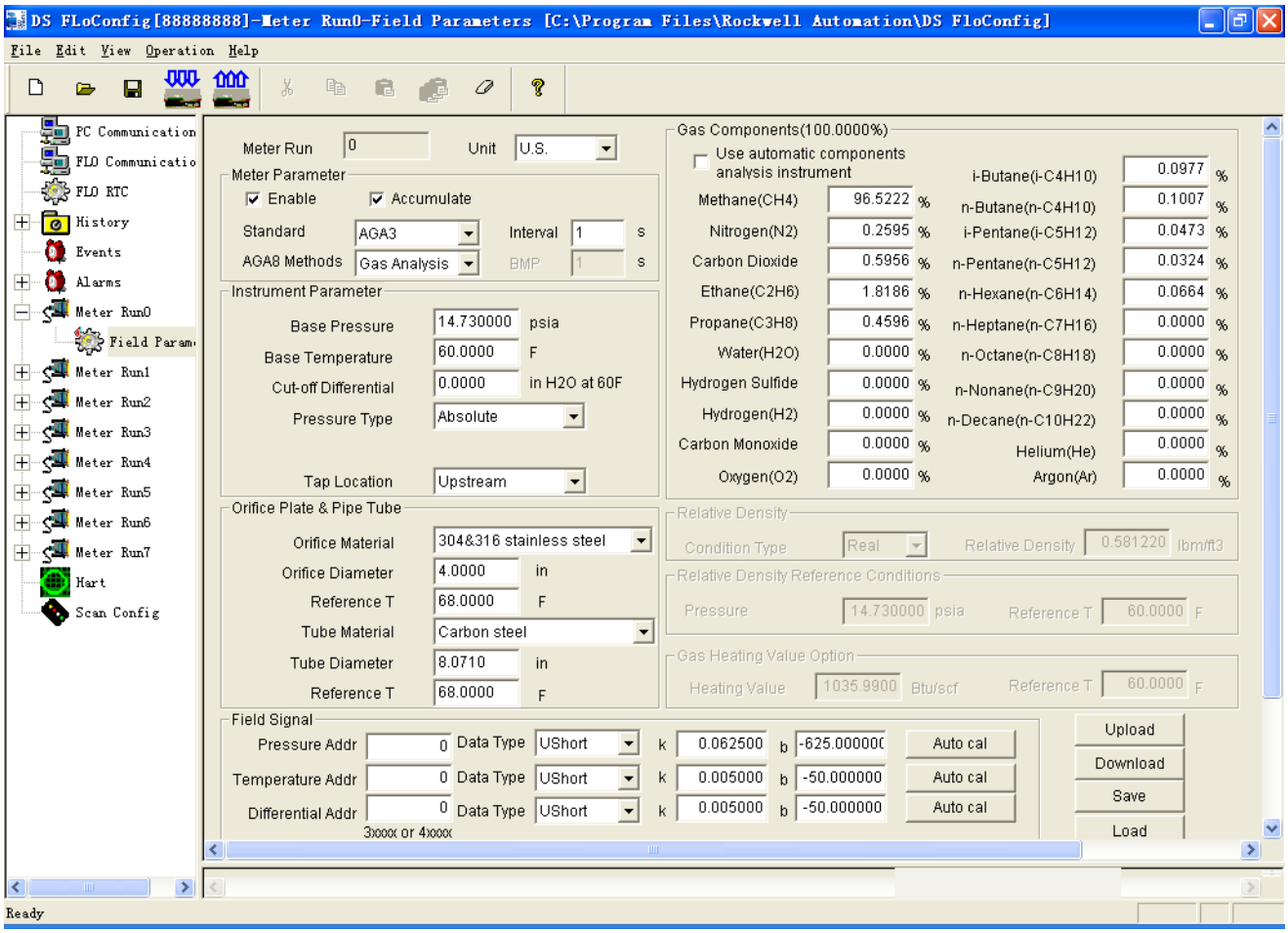
The branch for the meter run appears.



2. Click Field Parameters.



The field parameters of the selected meter run appear.



Select the Measurement System

Follow these steps to select the measurement system for the field parameters.

1. In the configuration tree, click the Meter Run item for the meter you want.

   The Meter Run dialog box for that meter appears.

2. From the Unit pull-down menu, choose the measurement system you want.



3. Click Download to apply the settings to the DataSite controller.

The parameter units are defined as shown in this table.

Imperial units of measurement for field parameters

Parameter	Unit	DS FloConfig Display
Tube and orifice diameters	inches	in
Static, base and atmospheric pressure	psia	psia
Differential pressure	inches H_20 at 60 °F	in H_20 at 60 F
Flowing and base temperature	°F	F
Density	lbm/ft^3	lbm/ft3
Mass	lbm	lbm
Mass flow rate	lbm/hr	lbm/hr
Volume	ft^3	ft3
Volume flow rate	ft^3/hr	ft3/hr
Heating value	BTU/scf	Btu/scf
Turbine rate	pulses/ft^3	pulses/ft3
Interval or BMP	s	s

Metric units of measurement for field parameters

Parameter	Unit	DS FloConfig Display
Tube and orifice diameters	millimeters	mm
Static, base and atmospheric pressure	bar	bar
Differential pressure	millibar	millibar

Metric units of measurement for field parameters

Parameter	Unit	DS FloConfig Display
Flowing and base temperature	°C	C
Density	kg/m^3	kg/m3
Mass	kg	kg
Mass flow rate	kg/hr	kg/hr
Volume	m^3	m3
Volume flow rate	m^3/hr	m3/hr
Heating value	MJ/m^3	MJ/m3
Turbine rate	$pulses/m^3$	pulses/m3
Interval or BMP	s	s

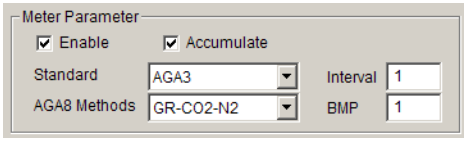
Enable a Meter Channel and Its Accumulation Calculation

DS FloConfig lets you select the meter channel you want to enable for measurement. When a meter channel is enabled, the flow meter will calculate the flow rates of this meter.

After enabling a meter channel, you can choose to enable the accumulation of variables. In this case, accumulation means that all the accumulated variables, such as the accumulated flow in this hour, the accumulated flow today, and the total accumulated volume, will increase once every second. The increased volume is the current instantaneous flow in this second (which is, flow rate).

Follow these steps to enable a meter.

1. Under Meter Parameter, select the Enable check box.



2. Click Download.

Follow these steps to calculate the accumulation quantity of the meter every second.

1. Under Meter parameter, ensure the Enable check box is selected.
2. Select the Accumulate check box.
3. Click Download to apply the settings to the DataSite controller.

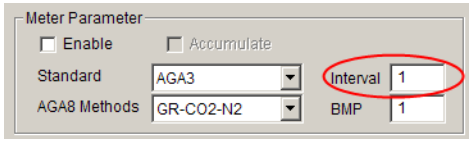
IMPORTANT After installing a meter, enable one meter first. Make sure all the parameters have been set correctly and the flow rate has been calculated correctly before you select the Accumulate check box to start the accumulated flow calculation every second.

Set the Flow Rate Calculation Interval

The flow rate calculation interval is the interval at which flow rates are calculated. You can set this interval according to your requirements. The default value is 1 s.

Follow these steps to set the flow rate calculation interval.

1. Under Meter Parameter, enter the interval, in seconds, in the Interval text box.

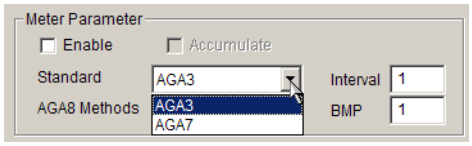


2. Click Download to apply the settings to the DataSite controller.

Select the Gas Flow Calculation Standard (AGA3/AGA7)

Follow these steps to select the gas flow calculation standard.

1. Under Meter Parameter, from the Standard pull-down menu, choose the gas flow calculation standard according to on-site conditions.
   - AGA3 for Orifice plate
   - AGA7 for Turbine



2. Click Download to apply the settings to the DataSite controller.

Configure AGA3 Process Parameters

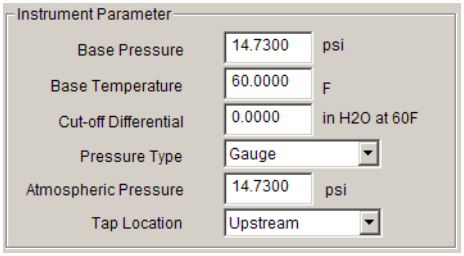
If you choose the AGA3 gas flow calculation standard, you need to configure these parameters:

- Instrument parameters
- Orifice Plate parameters

TIP For any changes to parameter settings to be applied to the DataSite controller, you need to click Download.

IMPORTANT Before downloading any changes to the DataSite controller, it is recommended that you perform an upload. This helps prevent modifying information that you did not intend to change.

Instrument Parameters for AGA3 Standard



- Base Pressure and Base Temperature

  This is the pressure and temperature under base conditions.

- Pressure Type

  This is the static pressure type tested by pressure meter. The pressure type could be an absolute static pressure or gauge static pressure.

  If it is the absolute static pressure, then entering the atmospheric pressure is not required.

  Absolute static pressure = Gauge static pressure + Atmospheric pressure

- Cut-off Differential

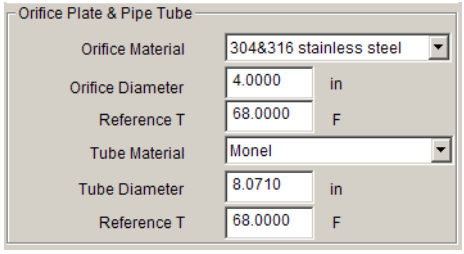
  When the differential pressure is lower than the value entered in the Cut-off Differential box, the DataSite controller will consider any flow as inexistent.

  There will be a cutoff alarm in the Meter Run window, and the flow rates become zero when this happens.

- Tap Location

  This is the location of the flange taps. It could be on the upstream or the downstream of the orifice plate.

Orifice Plate Parameters for AGA3 Standard



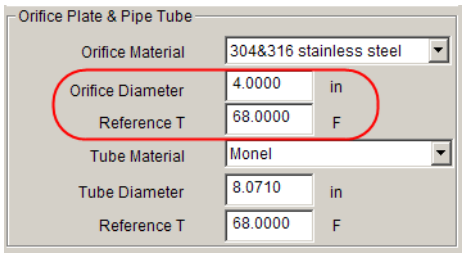
- Orifice Material and Tube Material

  Specify the material of the orifice plate and pipe tube by selecting it from the drop-down lists. These three materials are listed:

  – 304 and 316 stainless steel
  – Carbon steel
  – Monel

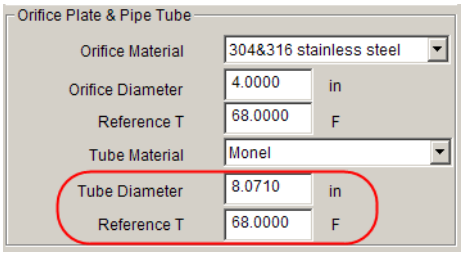
- Orifice Diameter

  This is the inner diameter of the orifice plate measured at the reference temperature specified in the Reference T box.



- Tube Diameter

  This is the inner diameter of tube measured at the reference temperature specified in the Reference T box.



Configure AGA7 Process Parameters

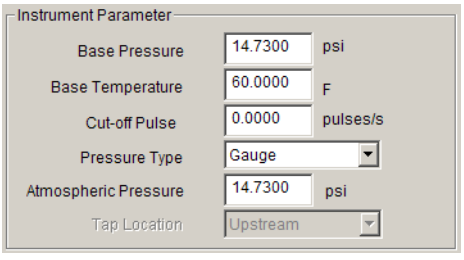
If you choose the AGA7 gas flow calculation standard, you need to configure these parameters:

- Instrument parameters

TIP For any changes to parameter settings to be applied to the DataSite controller, you need to click Download.

IMPORTANT Before downloading any changes to the DataSite controller, it is recommended that you perform an upload. This helps prevent modifying information that you did not intend to change.

Instrument Parameters for AGA7 Standard



These instrument parameters are the same for both AGA3 and AGA7 calculation methods:

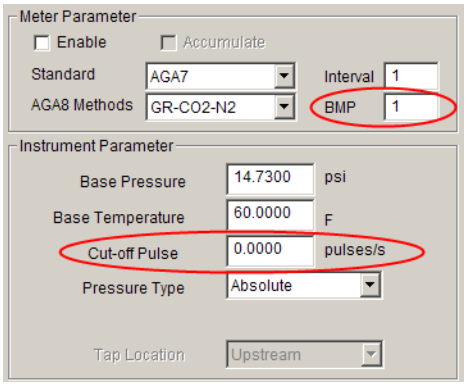
- Base pressure
- Base temperature
- Pressure type

For descriptions on these parameters, see Configure AGA3 Process Parameters on page 137.

- Cut-off Pulse

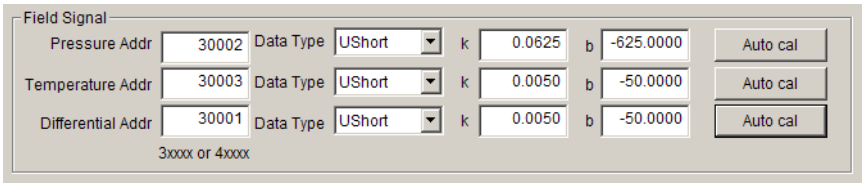
  When the pulse of the turbine meter during the base multiplier period (BMP) is lower than the value entered in the Cut-off Pulse box, the DataSite controller will consider any flow as inexistent.

  There will be a cutoff alarm in the Meter Run window, and the flow rates become zero when this happens.



Configure Field Signal Parameters for the AGA3 Standard

If you have chosen the AGA3 standard, you need to configure the parameters for the field signals accordingly.



TIP For any changes to parameter settings to be applied to the DataSite controller, you need to click Download.

IMPORTANT Before downloading any changes to the DataSite controller, it is recommended that you perform an upload. This helps prevent modifying information that you did not intend to change.

Signal Addresses

You need to enter the addresses for the static pressure (P), temperature (T), and differential pressure (DP) signals. These are the signals you have connected using the Analog In (AI) and/or HART channels during the setup of the DataSite controller. You may choose to use these signals from the AI0…AI5 channels on the DataSite controller. For more information on the wiring channel of each field signal, refer to I/O Wiring in the DataSite Electronic Flow Meter and Remote Terminal Unit Hardware User Manual, publication 1758-UM001.

Data Type

For each signal address, select its data type.

- UShort: Unsigned short
- Float: Floating point

k and b

The linear slope k and constant b are calculated using the engineering calibration range shown in the following table.

- Hi: the maximum engineering value range of the instrument connected with the AI channel.
- Lo: the minimum engineering value range of the instrument connected with the AI channel.

These are the default ranges for each signal.

- DP: 0…150 in H_2O of 60 °F
- P: 0…1500 psia
- T: 0…150 °F

Input	Address	Data Type	Data	k	b
AI0	30001	USHORT	1000…50000 Sampled processed value	(Hi-Lo)/(50000-10000)	Lo-10000*k
AI1	30002	USHORT	1000…50000 Sampled processed value	(Hi-Lo)/(50000-10000)	Lo-10000*k
AI2	30003	USHORT	1000…50000 Sampled processed value	(Hi-Lo)/(50000-10000)	Lo-10000*k
AI3	30004	USHORT	1000…50000 Sampled processed value	(Hi-Lo)/(50000-10000)	Lo-10000*k
AI4	30005	USHORT	1000…50000 Sampled processed value	(Hi-Lo)/(50000-10000)	Lo-10000*k
AI5	30006	USHORT	1000…50000 Sampled processed value	(Hi-Lo)/(50000-10000)	Lo-10000*k

Input	Address	Data Type	Data	k	b
HART	Address in 4xxxx	USHORT	Lo0…Hi0 processed value	(Hi-Lo)/(Hi0-Lo0)	Lo-Lo0*k
		FLOAT			
		FLOAT	Final engineering value	1	0
User Defined Signal source	Address in 4xxxx	FLOAT	Simulation data input	1	0

To obtain the P, T, or DP data from a HART instrument, first you need to use the HART function in DS FloConfig. You need to know the commands for reading the engineering values, so that you can store the returned engineering values into registers. For more information on this, see Configure HART Inputs on page 210.

If the HART instrument cannot provide engineering values directly, you can do the following calculation to get the values of k and b:

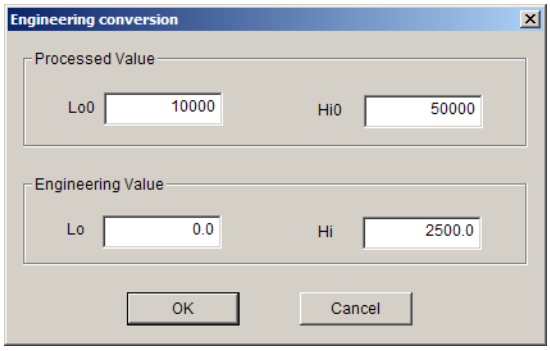
k = (Hi - Lo)/(Hi0 - Lo0)

b = Lo - Lo0*k

Follow these steps to get the values of k and b calculated by DS FloConfig.

1. Click Auto Cal.

   The Engineering Conversion dialog box appears.



2. Enter the values of Lo0, Hi0, Lo, and Hi in the dialog box.

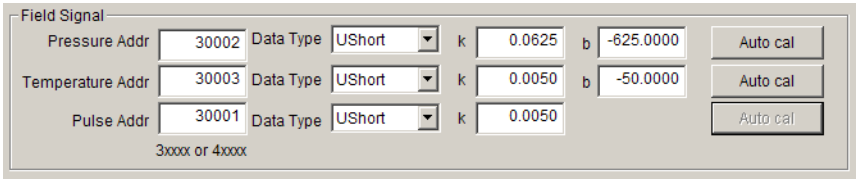
IMPORTANT For the normal signals from AI0~AI5, you should set Lo0 as 10000, Hi0 as 50000.

3. Click OK.

   The values of k and b are calculated by DS FloConfig and are displayed.

Configure Field Signal Parameters for the AGA7 Standard

If you have chosen the AGA7 standard, you need to configure the parameters for the field signals accordingly.



TIP For any changes to parameter settings to be applied to the DataSite controller, you need to click Download.

IMPORTANT Before downloading any changes to the DataSite controller, it is recommended that you perform an upload. This helps prevent modifying information that you did not intend to change.

For information on how to set the parameters for the pressure and temperature signals, see Configure Field Signal Parameters for the AGA3 Standard on page 140.

The pulse address is the address of the pulse signal from the PI (Pulse In) channel. You can choose from the PI 0…PI2 channels on the DataSite controller. The variable, k, is the k factor of turbine (pulses per cubic feet).

Input	Address	Data Type	Data	k
PI0	30011	USHORT	PI0 count value	k factor of turbine
PI1	30013	USHORT	PI0 count value	k factor of turbine
PI2	30015	USHORT	PI0 count value	k factor of turbine
User defined signal source	Address in 4xxxx	USHORT	Simulation data input which is always increasing	User defined k

Select an AGA8 Method

AGA8 is used for calculating compressibility factors of natural gas and other related hydrocarbon gases.

There are three AGA8 methods:

- Gas analysis

  This is the Detail Characterization Method in AGA8 standard. This method applies a detailed knowledge of the mole fractions of up to 21 components of natural gas.

- HV-GR-CO2

  This is the Gross Characterization Method 1 in AGA8 standard. This method uses heating value, relative density, and carbon dioxide content as inputs.

- GR-CO2-N2

  This is the Gross Characterization Method 2 in AGA8 standard. This method uses relative density, carbon dioxide content, and nitrogen content as inputs.

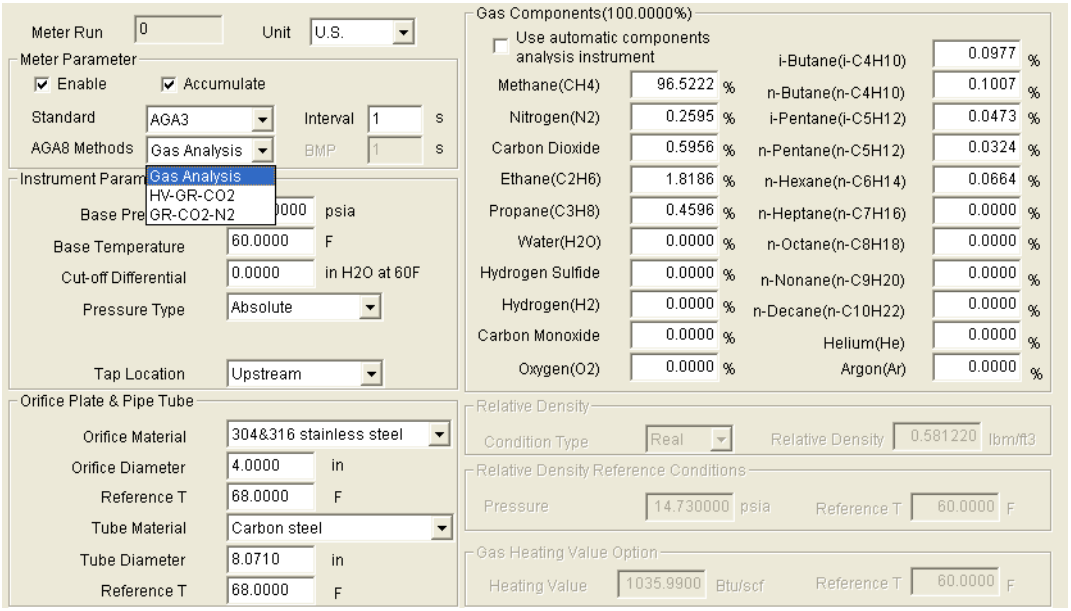
Select one of these methods according to the known conditions in the field and click Download to apply the settings to the DataSite controller.

Configure Parameters for the Gas Analysis Method

Follow these steps to calculate gas flow using gas analysis.

1. Under Meter Parameter, from the AGA8 Methods pull-down menu, choose Gas Analysis.

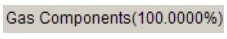
   Under Gas Components, all the fields become available.



2. Enter the mole percentage of each of the 21 components of natural gas.

IMPORTANT The mole percentage of each component should not exceed the range which is listed in table 1 of Valid Range of Gas Characteristics for AGA8 Methods on page 148, and the sum of the mole percentages should be equal to 100%. The error of this sum must be less than 0.0001.

TIP The total percentage is displayed next to the title, "Gas Components".

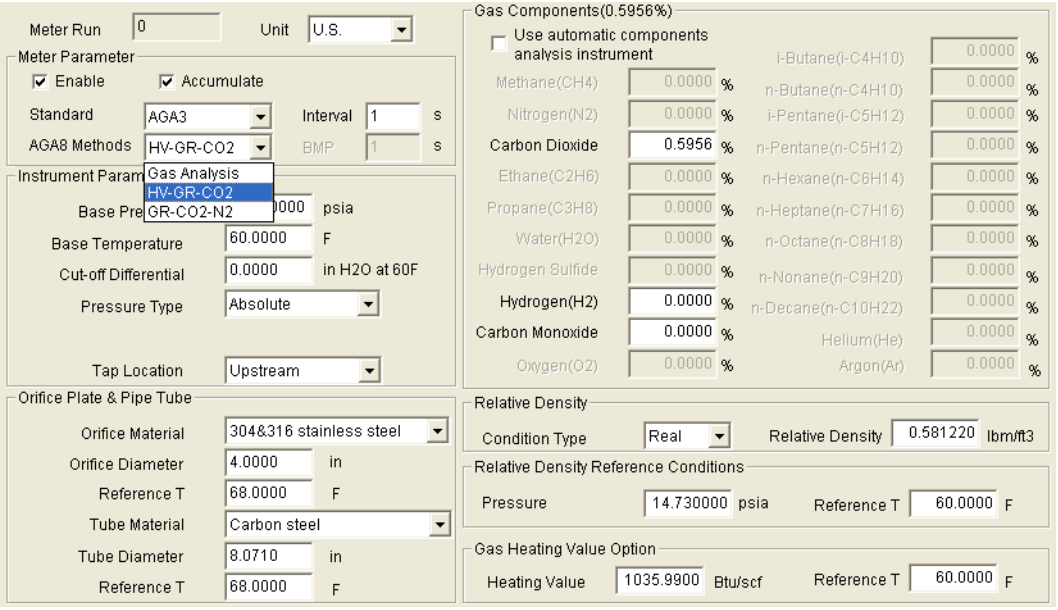


3. Click Download to apply the settings to the DataSite controller.

Configure Parameters for the HV-GR-CO2 Method

Follow these steps to calculate gas flow using the HV-GR-CO2 method.

1. Under Meter Parameter, from the AGA8 Methods pull-down menu, choose HV-GR-CO2.



2. Under Gas Components, enter the mole percentages of carbon dioxide, hydrogen, and carbon monoxide.

3. From the Condition Type pull-down menu, choose Real or Ideal, depending on the type of relative density of the gas.

4. In the Relative Density box, enter the relative density of the gas.

5. Under Relative Density Reference Conditions, enter the pressure and reference temperature of the gas.

6. Under Gas Heating Value Option, enter the heating value and reference temperature of the gas.

7. To save this configuration, click Save.
   The Save button is located to the right of the Field Signal parameters in the Meter Run window.

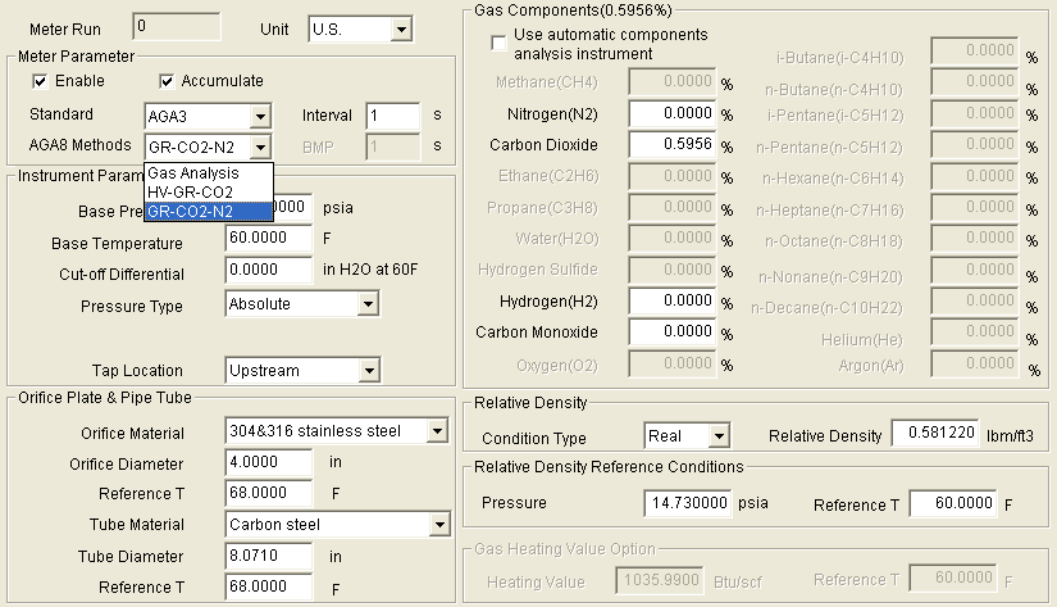
IMPORTANT The mole percentage of each component, the heating value and the relative density should not exceed the range which is listed in table 1 of Valid Range of Gas Characteristics for AGA8 Methods on page 148.

8. Click Download to apply the settings to the DataSite controller.

Configure Parameters for the GR-CO2-N2 Method

Follow these steps to calculate gas flow using GR-CO2-N2.

1. Under Meter Parameter, from the AGA8 Methods pull-down menu, choose GR-CO2-N2.



2. Under Gas Components, enter the mole percentages of carbon dioxide, nitrogen, hydrogen, and carbon monoxide.

3. From the Condition Type pull-down menu, choose Real or Ideal, depending on the type of relative density of the gas.

4. In the Relative Density box, enter the relative density of the gas.

5. Under Relative Density Reference Conditions, enter the pressure and reference temperature of the gas.

6. To save this configuration, click Save.
   The Save button is located to the right of the Field Signal parameters in the Meter Run window.

IMPORTANT The mole percentage of each component, heating value and relative density should not exceed the range which is listed in table 1 of Valid Range of Gas Characteristics for AGA8 Methods on page 148.

7. Click Download to apply the settings to the DataSite controller.

Valid Range of Gas Characteristics for AGA8 Methods

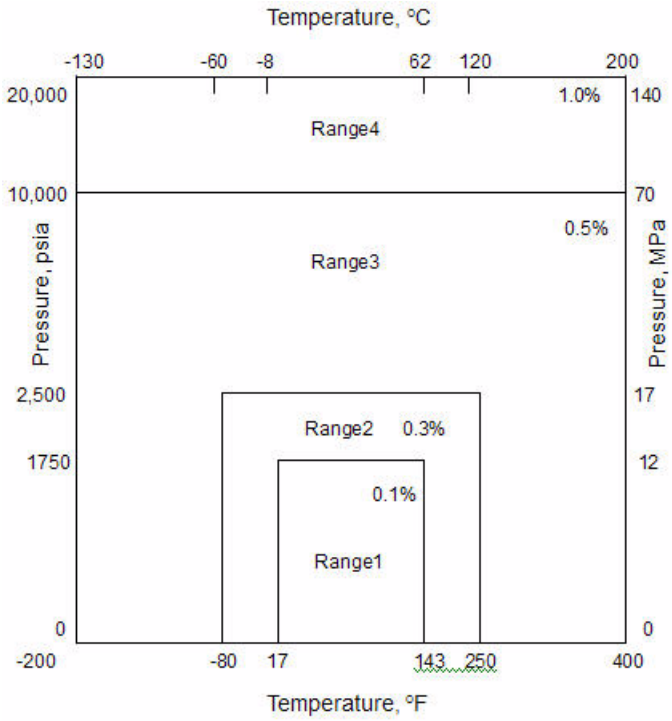
This table identifies the ranges of gas characteristics for which the AGA8 report can be used.

Quantity	Normal Range	Expanded Range
Relative density	0.56…0.87	0.07…1.52
Gross heating value(1)	477…1150 Btu/scf	0…1800 Btu/scf
Methane mole percent	45.0…100.0	0…100.0
Nitrogen mole percent	0.0…50.0	0…100.0
Carbon dioxide mole percent	0.0…30.0	0…100.0
Ethane mole percent	0.0…10.0	0…100.0
Propane mole percent	0.0…4.0	0…12.0
Butane mole percent	0.0…1.0	0…6.0
Pentane mole percent	0.0…0.3	0…4.0
Hexane mole percent	0.0…0.2	0…Dew point
Helium mole percent	0.0…0.2	0…3.0
Hydrogen mole percent	0(2)	0…100.0
Carbon monoxide mole percent	0(2)	0…3.0
Argon mole percent	0(2)	0…1.0
Oxygen mole percent	0(2)	0…21.0
Water mole percent	0.0…0.05	0…Dew point
Hydrogen sulfide mole percent	0.0…0.02	0…100.0

(1) Reference conditions are as follows: Combustion at 60 °F, 14.73 psia; density at 60 °F, 14.73 psia.

(2) The normal range is considered to be zero for these compounds.

The Normal Range column gives the range of gas characteristics for which the average expected uncertainty corresponds to the uncertainties identified in the following figure. The Expanded Range column gives the average uncertainties of gas characteristics. This is expected to be higher than the Normal Range, specifically outside of Range 1 shown in the following figure.



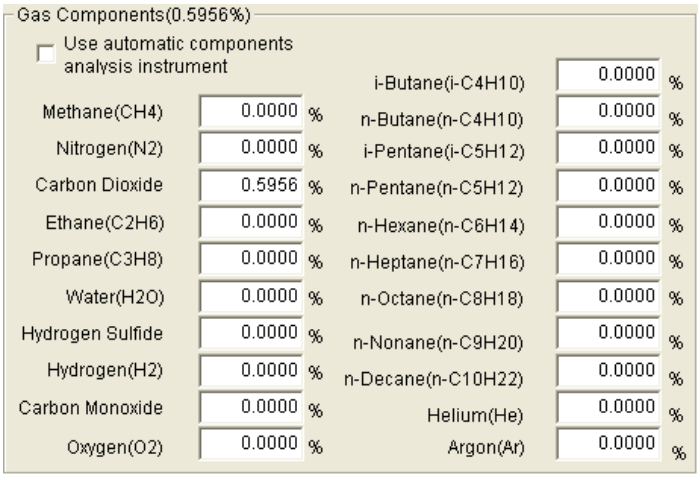
Acquire the Gas Component Parameter values

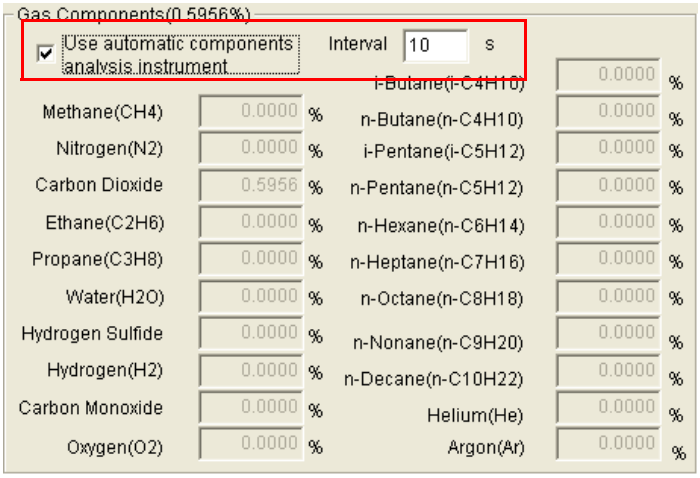
You can configure the Gas Component Parameter as described in Select an AGA8 Method on page 144, but you can also you can acquire the Gas Component Parameter values from the Use automatic components analysis instrument option.

1. Select the Use automatic components analysis instrument option.

2. A number field for setting the Interval appears, while the gas component number fields are disabled. The default interval value is 10 seconds, while the range is 10…65535.
   The Gas Component values are automatically acquired from the analysis instrument.

For more information, see Modbus Registers for Reading Gas Component Parameters on page 277.


Gas Components(0.5956%)
Use automatic components analysis instrument
Methane(CH4) 0.0000 %
Nitrogen(N2) 0.0000 %
Carbon Dioxide 0.5956 %
Ethane(C2H6) 0.0000 %
Propane(C3H8) 0.0000 %
Water(H2O) 0.0000 %
Hydrogen Sulfide 0.0000 %
Hydrogen(H2) 0.0000 %
Carbon Monoxide 0.0000 %
Oxygen(O2) 0.0000 %
i-Butane(i-C4H10) 0.0000 %
n-Butane(n-C4H10) 0.0000 %
i-Pentane(i-C5H12) 0.0000 %
n-Pentane(n-C5H12) 0.0000 %
n-Hexane(n-C6H14) 0.0000 %
n-Heptane(n-C7H16) 0.0000 %
n-Octane(n-C8H18) 0.0000 %
n-Nonane(n-C9H20) 0.0000 %
n-Decane(n-C10H22) 0.0000 %
Helium(He) 0.0000 %
Argon(Ar) 0.0000 %


Gas Components(0.5956%)
Use automatic components analysis instrument
Interval 10 s
Methane(CH4) 0.0000 %
Nitrogen(N2) 0.0000 %
Carbon Dioxide 0.5956 %
Ethane(C2H6) 0.0000 %
Propane(C3H8) 0.0000 %
Water(H2O) 0.0000 %
Hydrogen Sulfide 0.0000 %
Hydrogen(H2) 0.0000 %
Carbon Monoxide 0.0000 %
Oxygen(O2) 0.0000 %
i-Butane(i-C4H10) 0.0000 %
n-Butane(n-C4H10) 0.0000 %
i-Pentane(i-C5H12) 0.0000 %
n-Pentane(n-C5H12) 0.0000 %
n-Hexane(n-C6H14) 0.0000 %
n-Heptane(n-C7H16) 0.0000 %
n-Octane(n-C8H18) 0.0000 %
n-Nonane(n-C9H20) 0.0000 %
n-Decane(n-C10H22) 0.0000 %
Helium(He) 0.0000 %
Argon(Ar) 0.0000 %

Configure the Historical Records

There are two types of historical records the DataSite controller can log: daily historical records and hourly historical records.

There are two types of variables used in the logging of historical records—fixed variables and user variables. For user variables, you need to select the user variables you want to record, and then download the selection to the controller.

Each hourly and daily record is in the following format:

- Date (format: YYMMDD)
- Time (format: HHMMSS)
- Code for measurement standards ('0' represents imperial standards, and '1' represents the metric system)
- Average pressure
- Average temperature
- Average differential pressure or meter pulses
- Relative density
- Volume flow rate at base conditions
- Volume flow rate at flowing conditions
- Mass rate
- Flow extension or uncorrected flow volume
- Energy (reserved)
- User variable 1
- User variable 2
- User variable 3
- User variable 4

The format allows up to four user variables for recording additional information.

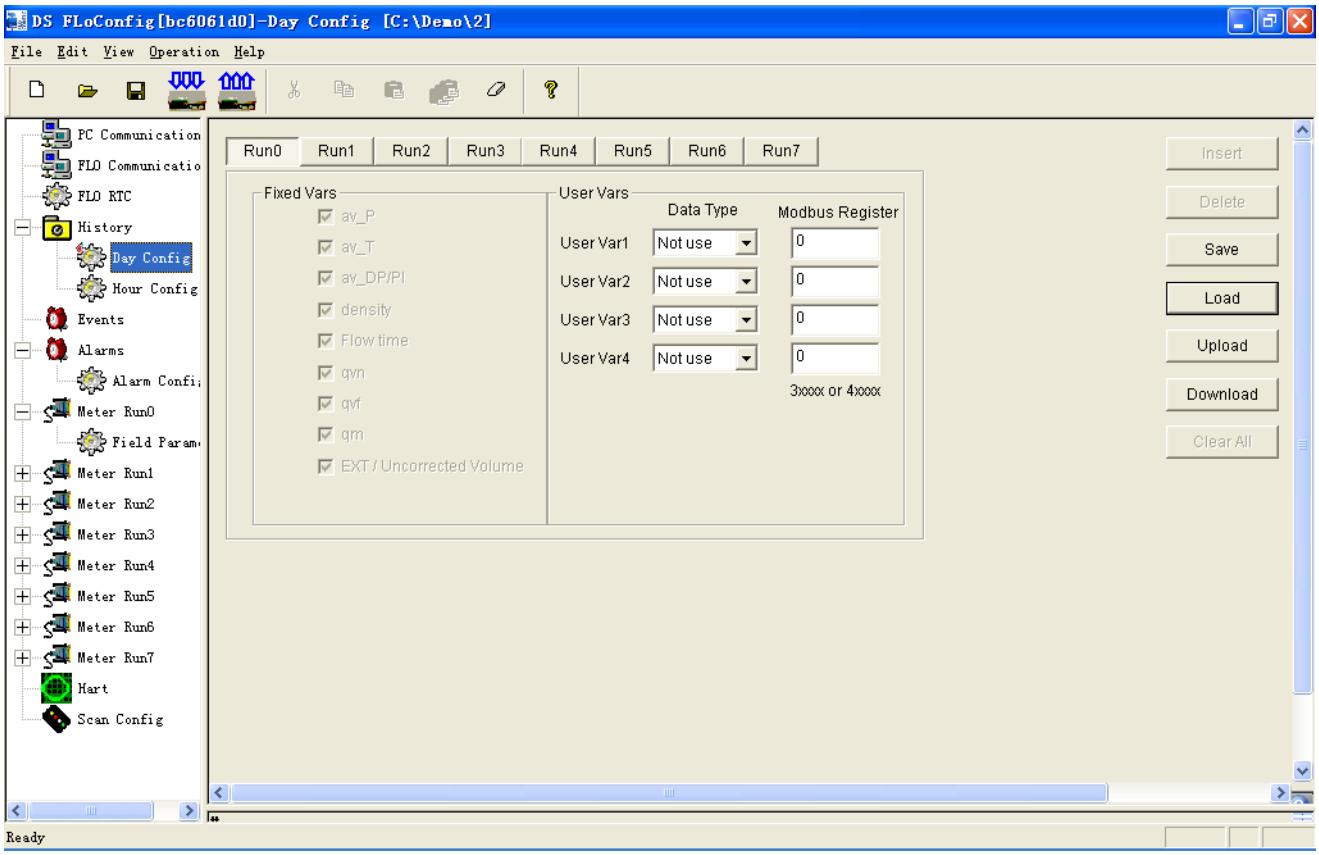
Configure the Daily Historical Records

Follow these steps to configure the variables you want to collect in the daily historical records.

1. In the configuration tree, double-click History.
   Alternatively, you can click the "+"before History to expand the History tree.

2. Click Day Config.

   The Day Config frame appears.



3. To select a meter run, click its corresponding button.
   The meter run buttons are located at the top of the Day Config frame.

4. To record more information, configure the user variables accordingly.
   To configure a user variable, select its data type from the Data Type list and enter its register address in the Modbus Register box.
   You can configure up to four user variables.

   The format for the other variables are fixed. The Energy variable is reserved and the value in record is zero.

5. To save the configuration to a file buffer on the PC, click Save.

   The message, "Save successful" appears.

6. Click OK to close the message box.

7. Click Download.

   The configuration is downloaded into the controller. At the same time, the message, "Download successful" appears.

8. Click OK to close the message box.

TIP The total number of daily records is 35.

Variables for Daily Historical Records

This table shows the variables you can log in the daily historical records. The details of some of the variables can be found in Display the Flow Results of a Meter Run on page 124.

Variable	Description
av_P	Daily average value of pressure.
av_T	Daily average value of temperature.
av_DP/PI	Daily average value of differential pressure (AGA3), in H2O at 60 °F, or pulse input count per second (AGA7), in counts/s.
Density	Average real relative density for the day.
Flow time	Flow time for the day.
qvn	Volume flow quantity of the last contract day in base conditions.
qvf	Volume flow quantity of the last contract day in flowing conditions.
qm	Mass flow quantity of the last contract day.
EXT/Uncorrected volume	Daily average of Flow Extension or Uncorrected Flow Volume.
Energy	Reserved. The value is zero.
User var1	An instantaneous value of the last contract day. This variable is user-configurable.
User var2	
User var3	
User var4	

For more information, see Display the Flow Results of a Meter Run on page 124.

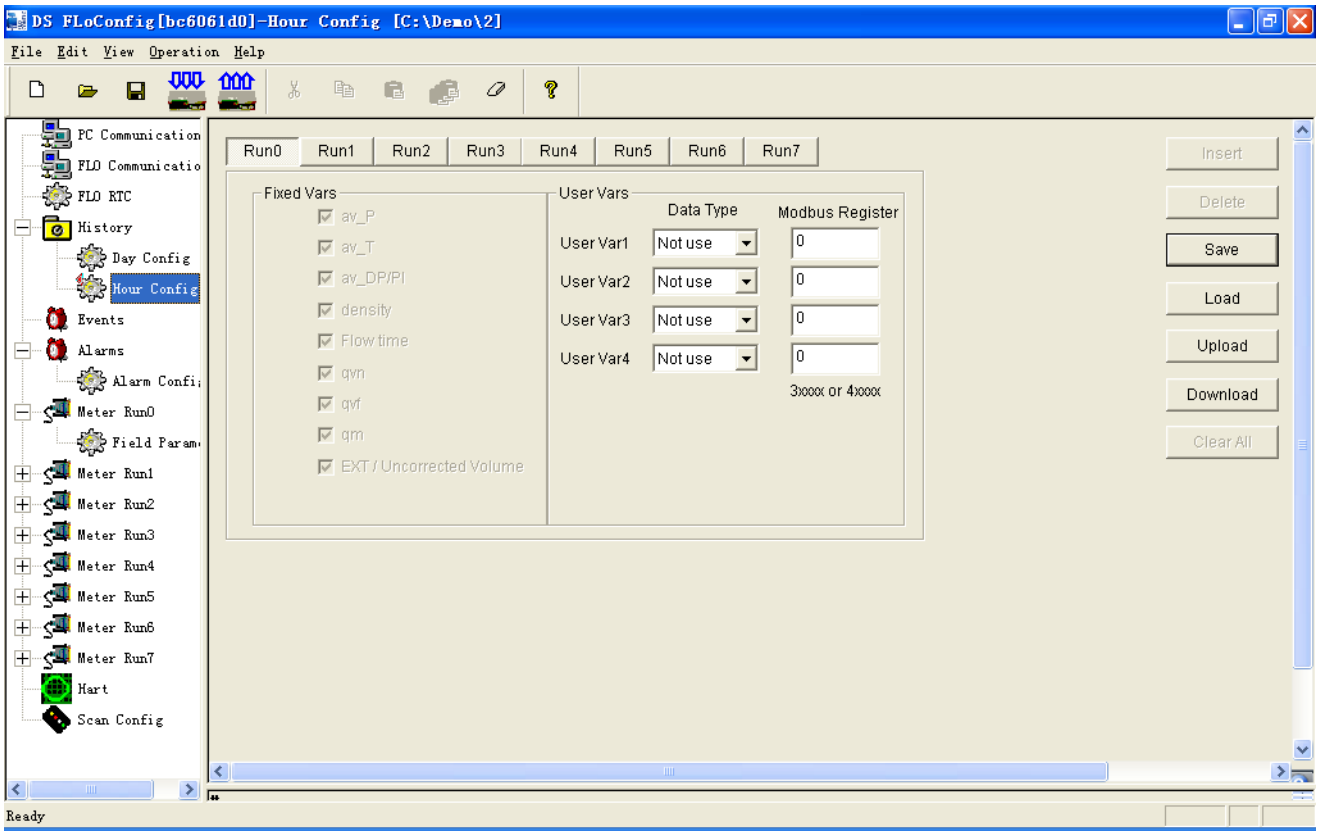
Configure the Hourly Historical Records

Follow these steps to configure the variables you want to collect in the hourly historical records.

1. In the configuration tree, double-click History.
   Alternatively, you can click the "+"before History to expand the History tree.

2. Click Hour Config.

   The Hour Config frame appears.



3. To select a meter run, click its corresponding button.
   The meter run buttons are located at the top of the Hour Config frame.

4. To record more information, configure the user variables accordingly.
   To configure a user variable, select its data type from the Data Type list and enter its register address in the Modbus Register box.
   You can configure up to four user variables.

   The format for the other variables are fixed. The Energy variable is reserved and the value in record is zero.

5. To save the configuration to a file buffer on the PC, click Save.

   The message, "Save successful" appears.

6. Click OK to close the message box.

7. Click Download.

   The configuration is downloaded into the controller. At the same time, the message, "Download successful" appears.

8. Click OK to close the message box.

TIP

The total number of hourly records is 1080 (36 x 30).

The rules of hourly historical records logged:

1. A record will be logged in every hour, giving a total of 24 records in a day.

2. Whenever a parameter is changed, a new hourly record will be created. However, only one record is created within an hour, and a total of six additional records in a day.

Variables for Hourly Historical Records

This table shows the variables you can select for logging in the hourly historical records.

Variable	Description
av_P	Hourly average value of pressure.
av_T	Hourly average value of temperature.
av_DP/PI	Hourly average value of differential pressure (AGA3), in H2O at 60 °F, or pulse input count per second (AGA7), in counts/s.
Density	Average real relative density for the current hour.
Flow time	Flow time for the current hour.
qvn	Volume flow quantity of the last hour in base conditions.
qvf	Volume flow quantity of the last hour in flowing conditions.
qm	Mass flow quantity of the last hour.
EXT/Uncorrected volume	Hourly average of Flow Extension or Uncorrected Flow Volume.
Energy	Reserved. The value is zero.

Variable	Description
User var1	An instantaneous value of the last hour. This variable is user-configurable.
User var2	
User var3	
User var4	

The details of some of the variables, such as flow time, can be found in Display the Flow Results of a Meter Run on page 124.

Load the Configuration from the PC

Follow these steps to load the configuration from the PC.

1. Click Load.

   The last saved configuration is loaded from the file on the PC and the message, “Load successful” appears.

2. Click OK.

Save the Configuration to the PC

Follow these steps to save the configuration to the PC.

1. Click Save.

   The message, “Save successful”, appears.

2. Click OK.

Upload the Configuration from the Controller

Follow these steps to upload (read) the configuration from the DataSite controller.

1. Click Upload.

2. Click OK.

Download the Configuration to the Controller

Follow these steps to download (write) the configuration to the DataSite controller.

1. Click Upload.
2. Click OK.

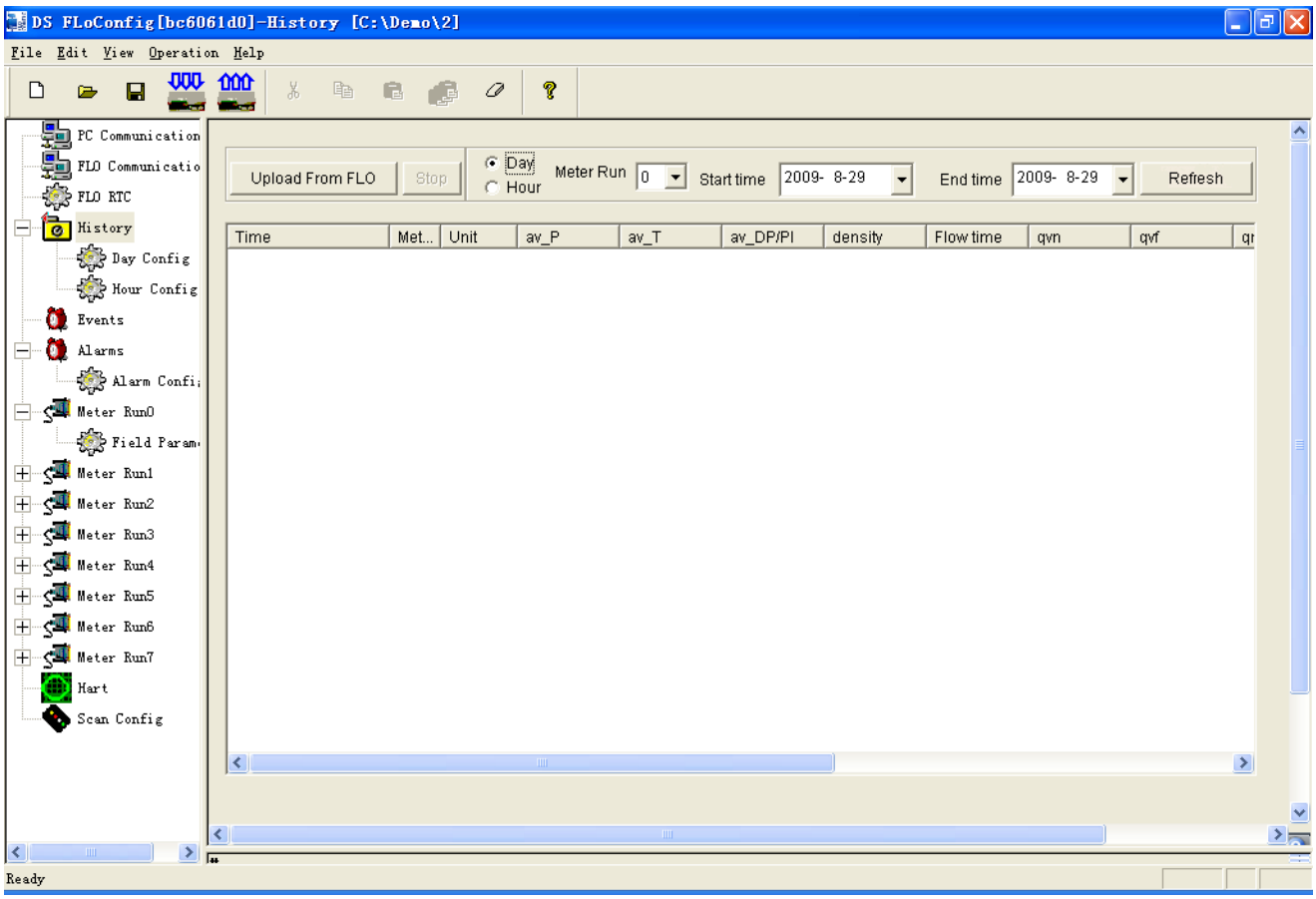
View Historical Records

For each meter run, you can review the daily records for the last 35 days and the hourly records for the last 36 days (including the current day).

Follow these steps to view the historical records.

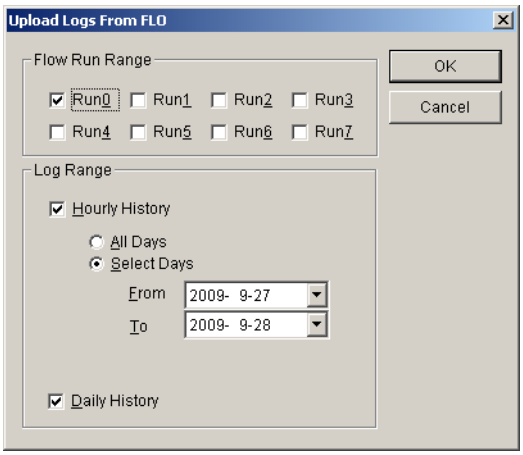
1. In the configuration tree, click History.

   The History dialog box appears.



2. Click Upload From FLO.

The following dialog box appears.



3. Under Flow Run Range, select the meter run whose logs you want to view.

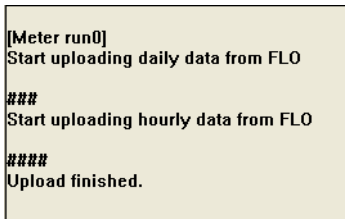
4. Under Log Range, select the check box for the type of records you want to view. You can select both Hourly History and Daily History.

5. If you have selected the Hourly History check box, click All Days if you want to retrieve the hourly records for all the past 36 days. Otherwise, click Select Days and enter the start and end dates for the desired period.

TIP The length of time required for the records to be uploaded depends on the number of records selected.

6. Click OK.

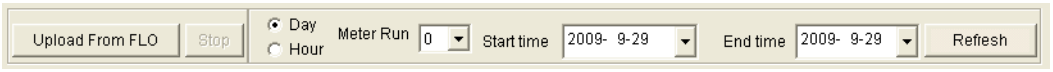
Some information appears in the status bar. The following is an example of what would be displayed after clicking OK.



The message "Upload finished" indicates that the upload is completed.

An alternative method of retrieving the historical records is by using the toolbar:

1. Click Day or Hour on the toolbar, depending on which type of historical records you want to upload.

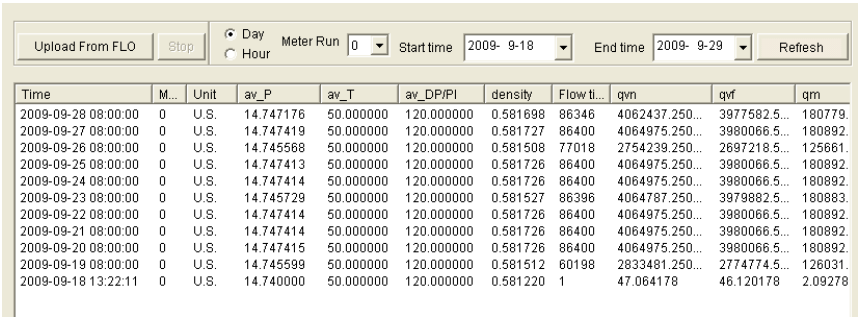


2. From the Meter Run pull-down menu, choose the meter run.

3. From the Start Time pull-down menu, choose the start time for the historical records.

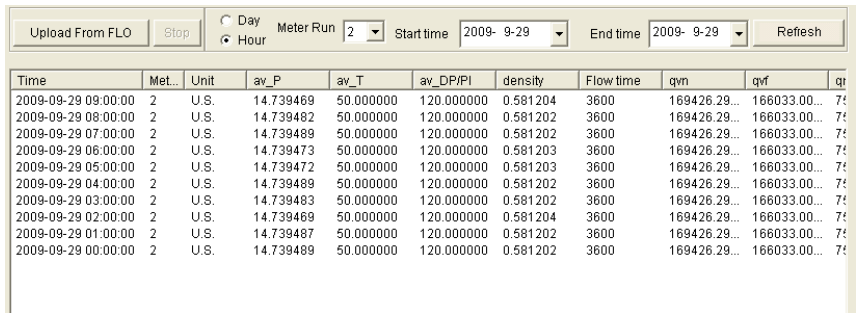
4. From the End Time pull-down menu, choose the end time.

   The following is an example of daily records from 2009-9-18 to 2009-9-28 for meter run 0:



Time	M...	Unit	av_P	av_T	av_DP/PI	density	Flow ti...	qvn	qvf	qm
2009-09-28 08:00:00	0	U.S.	14.747176	50.000000	120.000000	0.581698	86346	4062437.250...	3977582.5...	180779.
2009-09-27 08:00:00	0	U.S.	14.747419	50.000000	120.000000	0.581727	86400	4064975.250...	3980066.5...	180892.
2009-09-26 08:00:00	0	U.S.	14.745568	50.000000	120.000000	0.581508	77018	2754239.250...	2697218.5...	125661.
2009-09-25 08:00:00	0	U.S.	14.747413	50.000000	120.000000	0.581726	86400	4064975.250...	3980066.5...	180892.
2009-09-24 08:00:00	0	U.S.	14.747414	50.000000	120.000000	0.581726	86400	4064975.250...	3980066.5...	180892.
2009-09-23 08:00:00	0	U.S.	14.745729	50.000000	120.000000	0.581527	86396	4064787.250...	3979882.5...	180883.
2009-09-22 08:00:00	0	U.S.	14.747414	50.000000	120.000000	0.581726	86400	4064975.250...	3980066.5...	180892.
2009-09-21 08:00:00	0	U.S.	14.747414	50.000000	120.000000	0.581726	86400	4064975.250...	3980066.5...	180892.
2009-09-20 08:00:00	0	U.S.	14.747415	50.000000	120.000000	0.581726	86400	4064975.250...	3980066.5...	180892.
2009-09-19 08:00:00	0	U.S.	14.745599	50.000000	120.000000	0.581512	60198	2833481.250...	2774774.5...	126031.
2009-09-18 13:22:11	0	U.S.	14.740000	50.000000	120.000000	0.581220	1	47.064178	46.120178	2.09278

   The following is an example of hourly records from 2009-9-29 to 2009-9-29 for meter run 2:



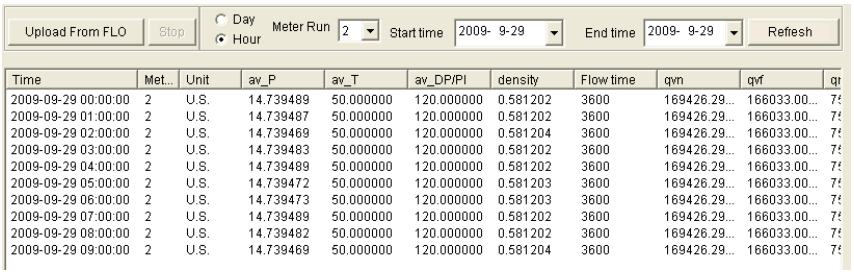
Time	Met...	Unit	av_P	av_T	av_DP/PI	density	Flow time	qvn	qvf	qi
2009-09-29 09:00:00	2	U.S.	14.739469	50.000000	120.000000	0.581204	3600	169426.29...	166033.00...	75
2009-09-29 08:00:00	2	U.S.	14.739482	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75
2009-09-29 07:00:00	2	U.S.	14.739489	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75
2009-09-29 06:00:00	2	U.S.	14.739473	50.000000	120.000000	0.581203	3600	169426.29...	166033.00...	75
2009-09-29 05:00:00	2	U.S.	14.739472	50.000000	120.000000	0.581203	3600	169426.29...	166033.00...	75
2009-09-29 04:00:00	2	U.S.	14.739489	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75
2009-09-29 03:00:00	2	U.S.	14.739483	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75
2009-09-29 02:00:00	2	U.S.	14.739469	50.000000	120.000000	0.581204	3600	169426.29...	166033.00...	75
2009-09-29 01:00:00	2	U.S.	14.739487	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75
2009-09-29 00:00:00	2	U.S.	14.739489	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75

For a description of the variables used in the records, see Variables for Daily Historical Records on page 153 and Variables for Hourly Historical Records on page 155.

Sort Historical Records

You can sort the records by clicking the column headings. For example, if you click the Time column heading once, the records will be sorted in chronological order. Clicking the column headings more than once will toggle the sort order. For example, if you click the Time column heading again, the records will be sorted in reverse chronological order.

The following is an example of hourly records from 2009-9-29 to 2009-9-29 for meter run 2, sorted in chronological order:



Time	Met...	Unit	av_P	av_T	av_DP/PI	density	Flow time	qvn	qvf	qr
2009-09-29 00:00:00	2	U.S.	14.739489	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75
2009-09-29 01:00:00	2	U.S.	14.739487	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75
2009-09-29 02:00:00	2	U.S.	14.739469	50.000000	120.000000	0.581204	3600	169426.29...	166033.00...	75
2009-09-29 03:00:00	2	U.S.	14.739483	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75
2009-09-29 04:00:00	2	U.S.	14.739489	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75
2009-09-29 05:00:00	2	U.S.	14.739472	50.000000	120.000000	0.581203	3600	169426.29...	166033.00...	75
2009-09-29 06:00:00	2	U.S.	14.739473	50.000000	120.000000	0.581203	3600	169426.29...	166033.00...	75
2009-09-29 07:00:00	2	U.S.	14.739489	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75
2009-09-29 08:00:00	2	U.S.	14.739482	50.000000	120.000000	0.581202	3600	169426.29...	166033.00...	75
2009-09-29 09:00:00	2	U.S.	14.739469	50.000000	120.000000	0.581204	3600	169426.29...	166033.00...	75

To display the records in unsorted order, click Refresh.

Configure Alarm Events

Before the DataSite controller can start recording alarm events from alarm signals, you need to configure the alarm triggers and download this configuration to the controller.

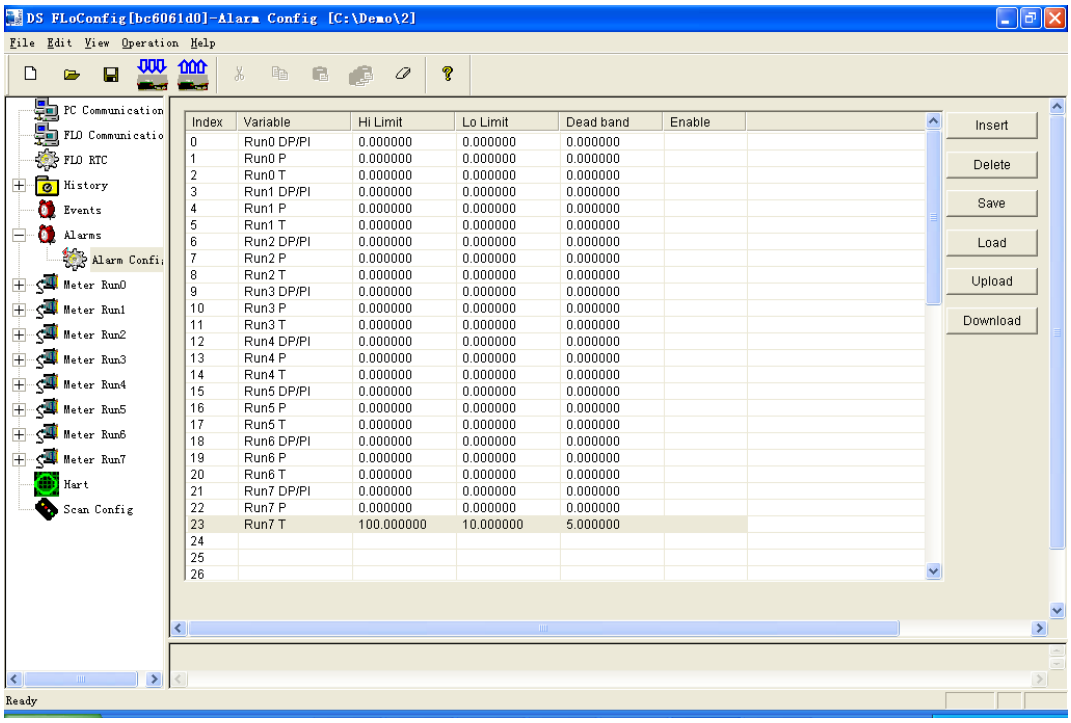
Open the Alarm Config dialog box

Follow these steps to open the Alarm Config dialog box.

1. In the configuration tree, double-click Events.
   Alternatively, you can click the "+"before Events to expand the Events tree.

2. Click Alarm Config.

   The Alarm Config dialog box appears.



Alarm Variables

Use alarm variables to indicate which signal variable should have an alarm and what the alarm limits are.

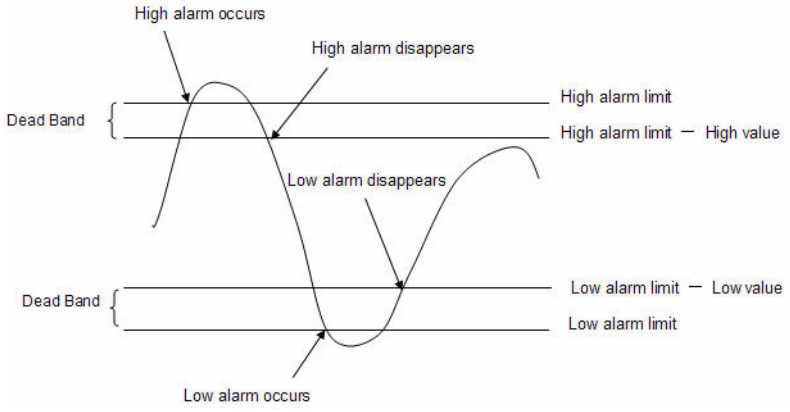
There are a total of 64 alarm variables. 24 variables, indexed from 0…23, are fixed for 8 meter runs (0…7). Every meter run has alarm variables for DP/PI, P, and T. If you want to log alarm events, you need to enable them. Another 40 variables, indexed from 24…63, can be added to the log.

Fixed variables are:

- DP/PI: Differential pressure/Pulse count
- P: Pressure
- T: Temperature
- Hi Limit: the high limit of the alarm
- Lo Limit: the low limit of the alarm
- Dead Band: the dead band of the alarm

When the signal variable exceeds the Hi Limit, a high limit alarm will occur, and the value in the alarm event is the current value of the signal.
In the case of a high limit alarm, if the value of the detected current signal is less than the high limit of the alarm minus the dead band of the alarm, the high limit alarm disappears.

When the signal variable is less than the Lo limit of the alarm, a low limit alarm will occur, and the value of the alarm event is the current value of the signal.
In the case of a low limit alarm, if the value of the detected current signal is more than the low limit of the alarm plus the dead band value, the low limit alarm disappears.



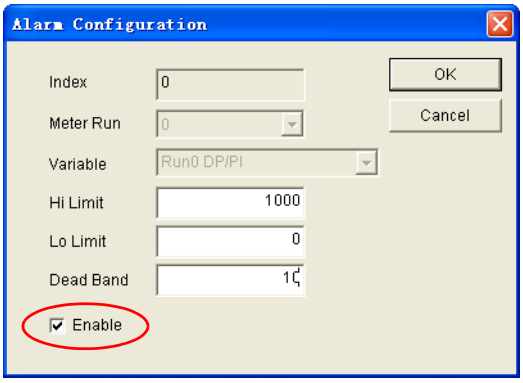
IMPORTANT If the current flow meter is AGA3, set the Hi Limit, Lo Limit, and Dead Band of the DP (differential pressure). If it is AGA7, set the Hi Limit, Lo Limit, and Dead Band of the PI (pulse count).

Enable an Alarm Configuration

Follow these steps to enable an alarm configuration.

1. In the Alarm Config dialog box, double-click the alarm configuration you want to enable.

   The Alarm Configuration dialog box appears.

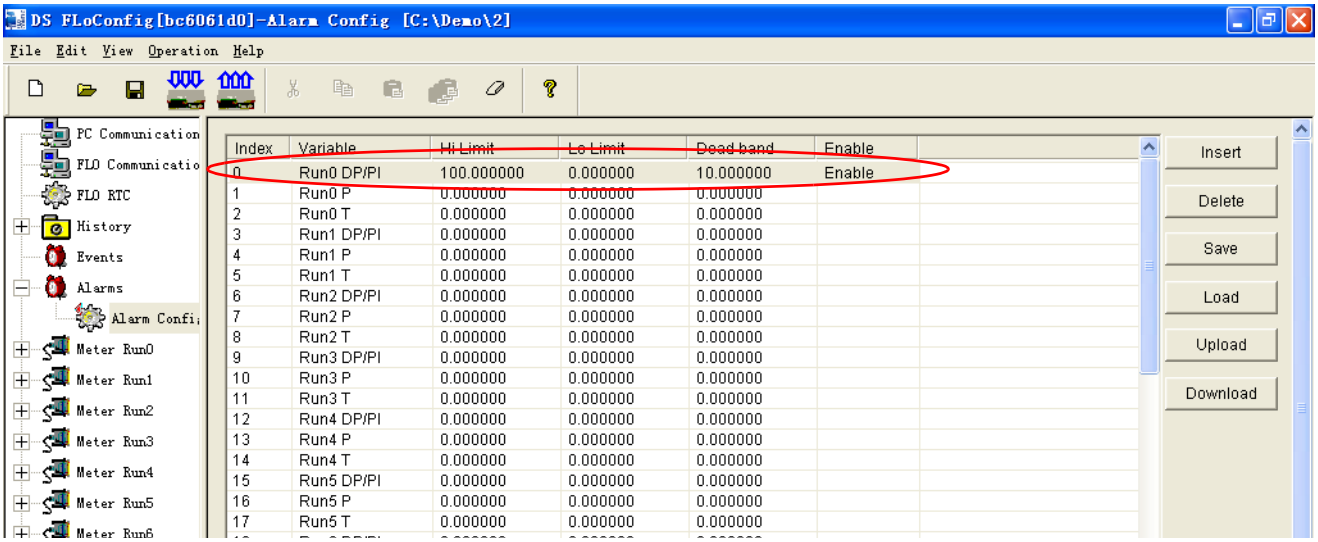


2. Enter the values for Hi Limit, Lo Limit and Dead Band.

3. Select the Enable check box.

4. Click OK to save the configuration.

   The configuration is displayed as 'Enabled'.



5. Click Download.

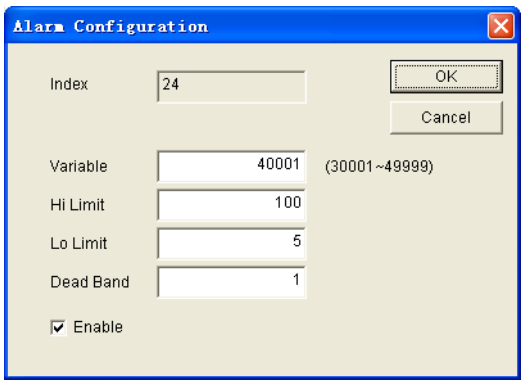
   The new settings are applied to the DataSite controller.

Insert an Alarm Configuration

Follow these steps to insert an alarm configuration block.

1. In the Alarm Config dialog box, click Insert.
   You can also double-click any blank row indexed 24…63 in the Alarm Config dialog box.

   The Alarm Configuration dialog box appears.



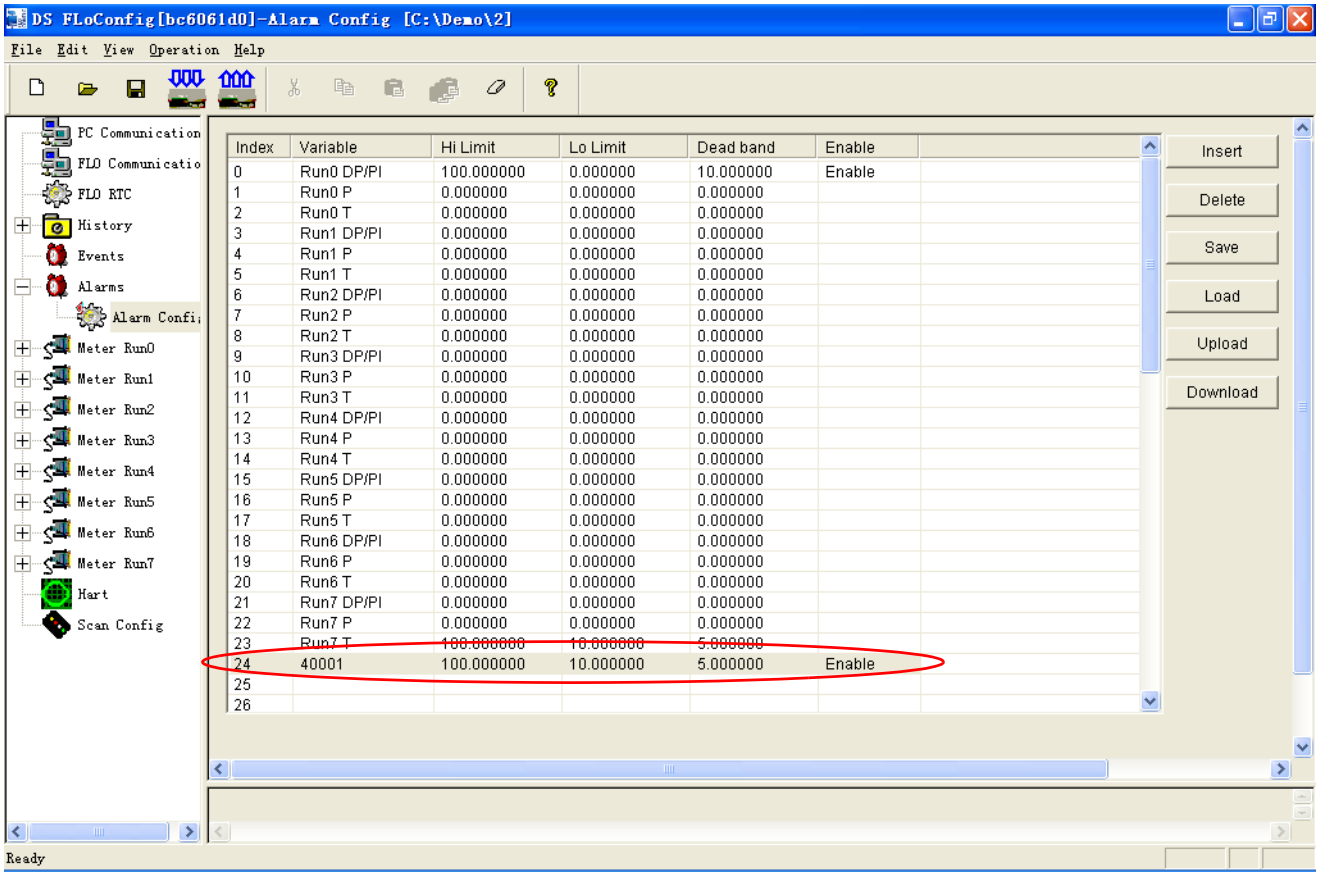
2. In the Alarm Configuration dialog box, enter the register address of the variable, and the values for Hi Limit, Lo Limit and Dead Band.

   For more information on the variables, see Delete an Alarm Configuration.

3. Select the Enable check box.

4. Click OK.

The new alarm configuration is added to the list.

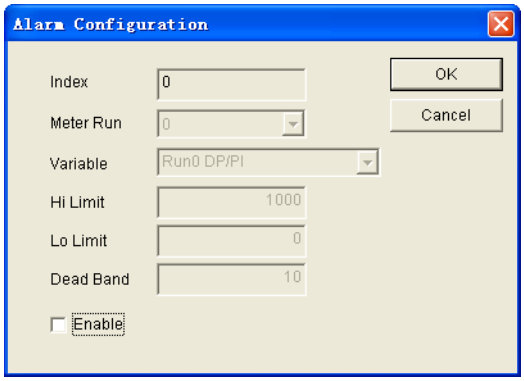


TIP The alarm variables indexed from 24…63 support only the float data type.

Disable an Alarm Configuration

Follow these steps to disable an alarm configuration block for fixed variables, indexed from 0…23.

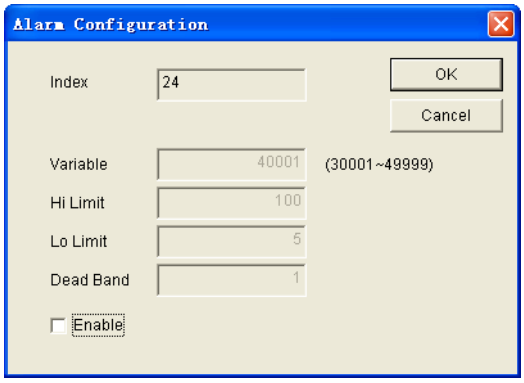
1. Double-click the fixed variable alarm configuration you want to disable.
2. Clear the Enable check box.



3. Click OK.

Follow these steps to disable an alarm configuration block for user variables, indexed from 24…63.

1. Double-click the user variable alarm configuration you want to disable.
2. Clear the Enable check box.



3. Click OK.

Delete an Alarm Configuration

Follow these steps to delete an alarm configuration block.

TIP Only the user variable alarm configuration blocks, indexed from 24…63, can be deleted. The fixed variable alarm configuration blocks cannot be deleted.

1. Select the user variable alarm configuration you want to delete.

IMPORTANT There is no Undo or Confirm function for the Delete action.

If, however, you do not click Save or Download after clicking Delete, you can re-upload or re-load the previous alarm configuration list.

2. Click Delete.

   The selected alarm configuration is deleted.

Load Alarm Configurations

This function enables you to load the last saved list of alarm configurations from the file buffer on the PC. This allows you to verify the configurations while the DataSite controller is offline.

1. Click Load.

   The message, “Load successful”, appears.

2. Click OK to close the message box.

Save Alarm Configurations

This function saves the list of alarm configurations into the file buffer on the PC.

1. Click Save.

   The message, “Save successful”, appears.

2. Click OK to close the message box.

Upload Alarm Configurations

Follow this step to upload (read) the list of alarm configurations from the DataSite controller. The controller needs to be online before you can upload the settings.

1. Click Upload.
2. Click OK to close the message box.

Download Alarm Configurations

Follow this step to download (write) the list of alarm configurations to the DataSite controller. The controller needs to be online before you can download the settings.

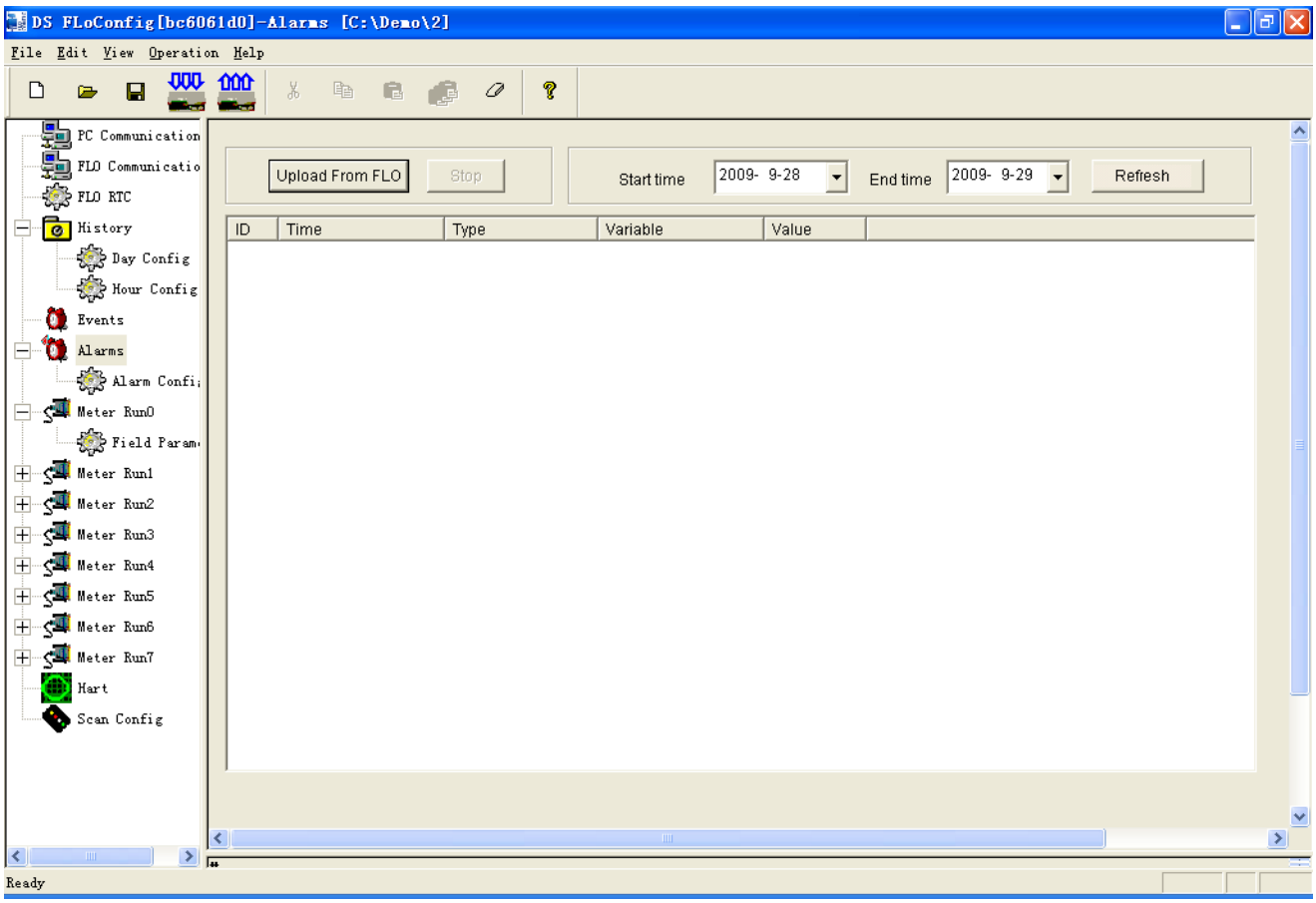
1. Click Download.
2. Click OK to close the message box.

View Alarm Event Records

Alarm events include four types, Lo Limited, Hi Limited, Lo Recovery, and Hi Recovery. You can configure the signal variables you want to record. For more information, see Configuring Alarm Events. Examples of system events are controller power-off, power-on, and reset.

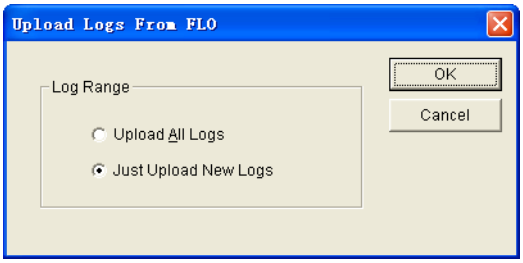
Follow these steps to display the Events log.

1. In the configuration tree, click Events.



2. Click Upload from FLO.

   The following dialog box appears.



3. Click Upload All Logs or Just Upload New Logs.

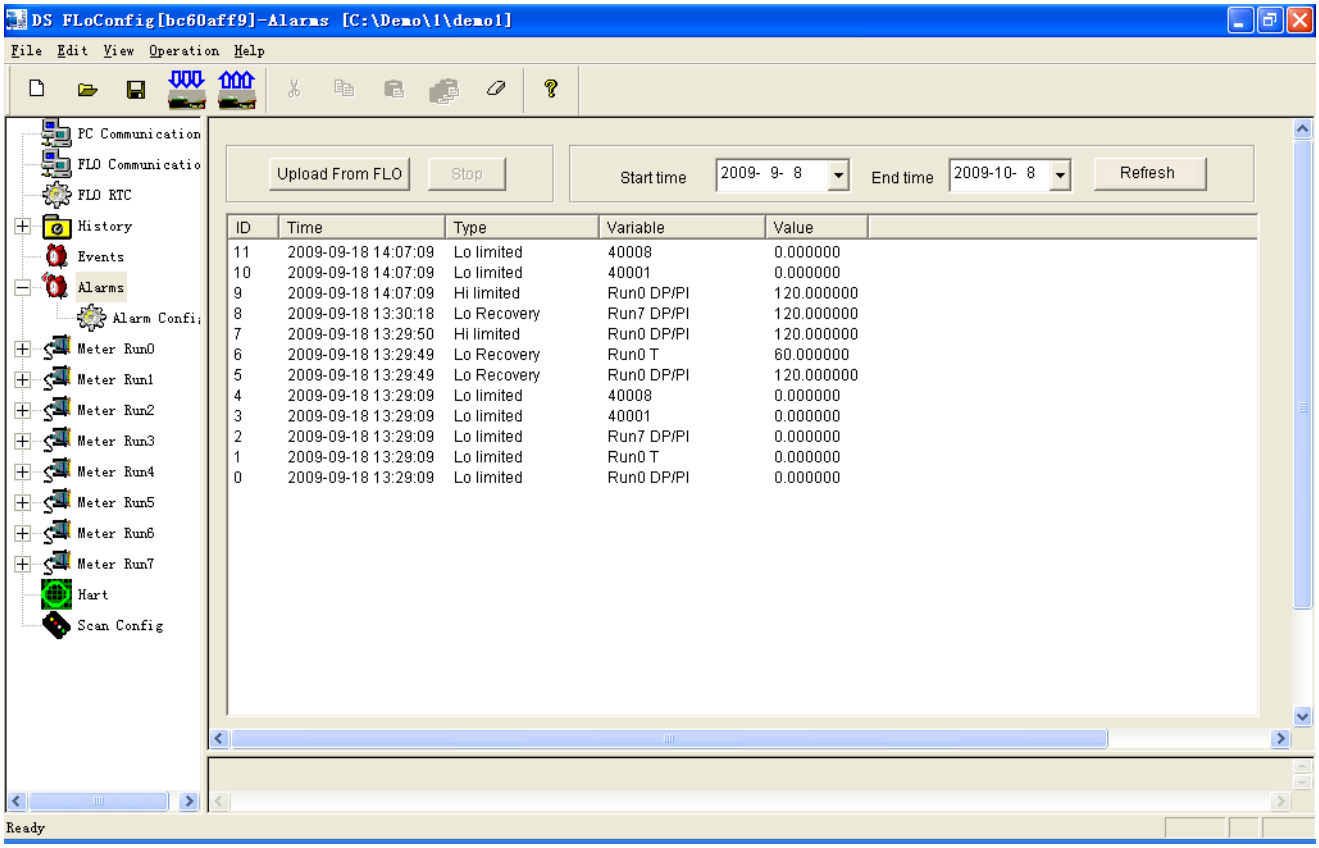
4. Click OK.

   The uploading will take some time. The length of time depends on the number of alarm event logs stored on the DataSite controller.

   While the uploading is in progress, some information appears in the status bar. The following is an example of the type of information displayed.

```
Start upload...
#########
Upload finished.
```

The following is an example display of event records after they are uploaded from the DataSite controller.



An alternative method of retrieving the event records is by using the toolbar:

1. From the Start Time pull-down menu, choose the start time for the event records.



2. From the End Time pull-down menu, choose the end time.
3. Click Refresh.

Sort Alarm Event Records

You can sort the records by clicking the column headings. For example, if you click the Time column heading once, the records will be sorted in chronological order. Clicking the column headings more than once will toggle the sort order. For example, if you click the Time column heading again, the records will be sorted in reverse chronological order.

The following is an example of event records sorted in chronological order:

ID	Time	Type	Variable	Value
7	2009-09-18 13:29:50	Hi limited	Run0 DP/PI	120.000000
9	2009-09-18 14:07:09	Hi limited	Run0 DP/PI	120.000000
21	2009-09-25 15:42:01	Lo limited	40008	0.000000
22	2009-09-25 18:01:19	Lo limited	40001	0.000000
31	2009-10-08 16:59:00	Lo limited	40001	0.000000

To display the records in unsorted order, click Refresh.

Understand the Alarm Record Format

An alarm record consists of the following components:

- ID: the serial number of the alarm record. The range of the ID is 0…65535. Once the number of records exceeds 65535, the ID starts from 0 again.
- Time: the date and time that the record is created. The date is in the format, year-month-day, and time is in the format, hour:minute:second.
- Type: See the following table, Descriptions of alarm event types.
- Variable: Three fixed variables for each meter run and 40 variables for user defined registers.
- Value: the current value of the variable.

Alarm Event Types

This table provides a list of alarm event types and their descriptions

Descriptions of alarm event types

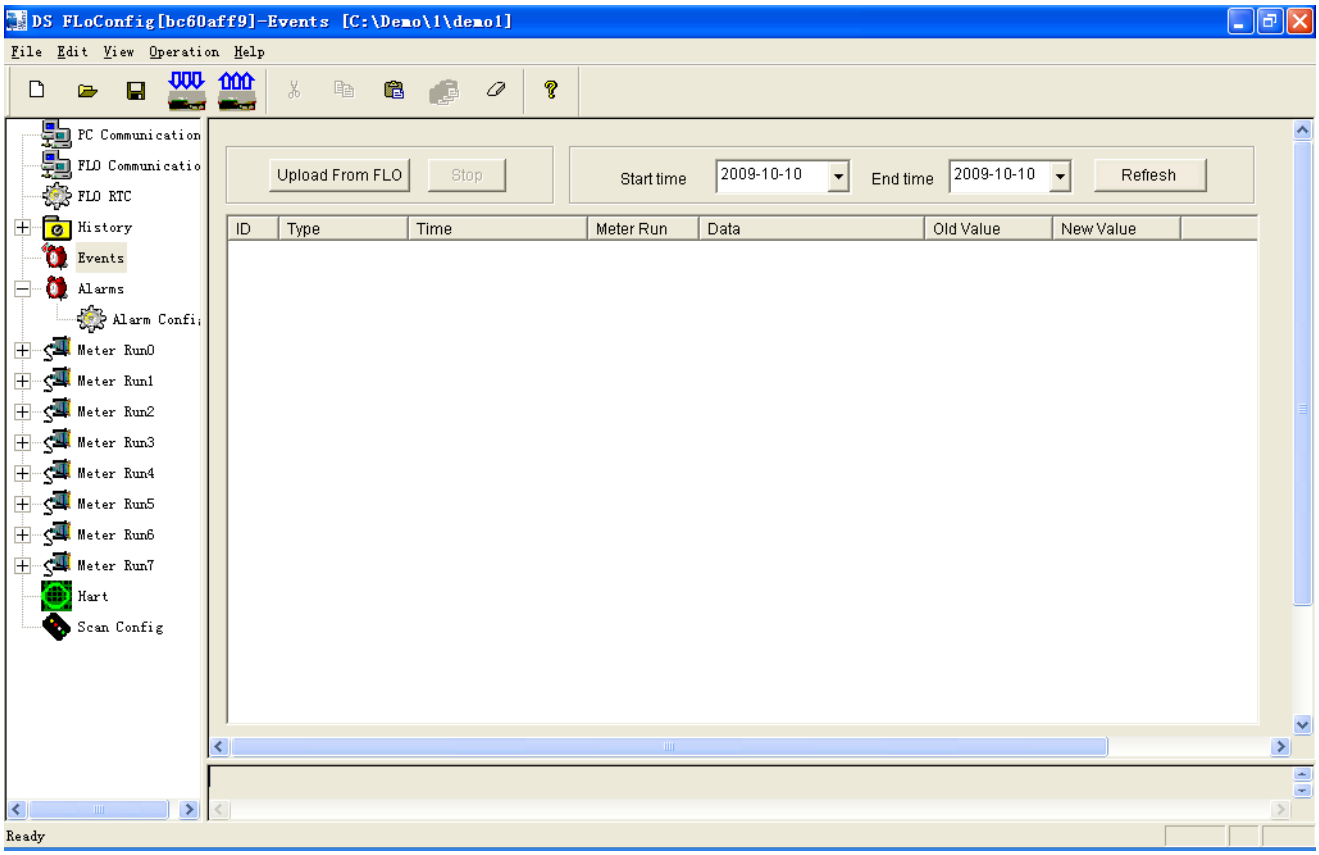
Event Type	Variable or Registers	Conditions
Hi limit	DP/PI, T, P or 30001…49999	The differential pressure (AGA3) or the pulse count per second (AGA7) is higher than the Hi limit for meter run 0…7
Lo limit		The differential pressure (AGA3) or the pulse count per second (AGA7) is lower than the Lo limit for meter run 0…7.
Hi recovery		The differential pressure (AGA3) or the pulse count per second (AGA7) is lower than the Hi limit minus the dead band for meter run 0…7.
Lo recovery		The differential pressure (AGA3) or the pulse count per second (AGA7) is higher than the Lo limit plus dead band for meter run 0…7.

View Event Records

Events include system events and modifications to parameters.

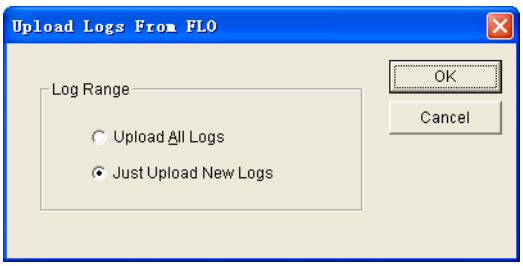
Follow these steps to display the Events log.

1. In the configuration tree, click Events.



2. Click Upload from FLO.

   The following dialog box appears.



3. Click Upload All Logs or Just Upload New Logs.

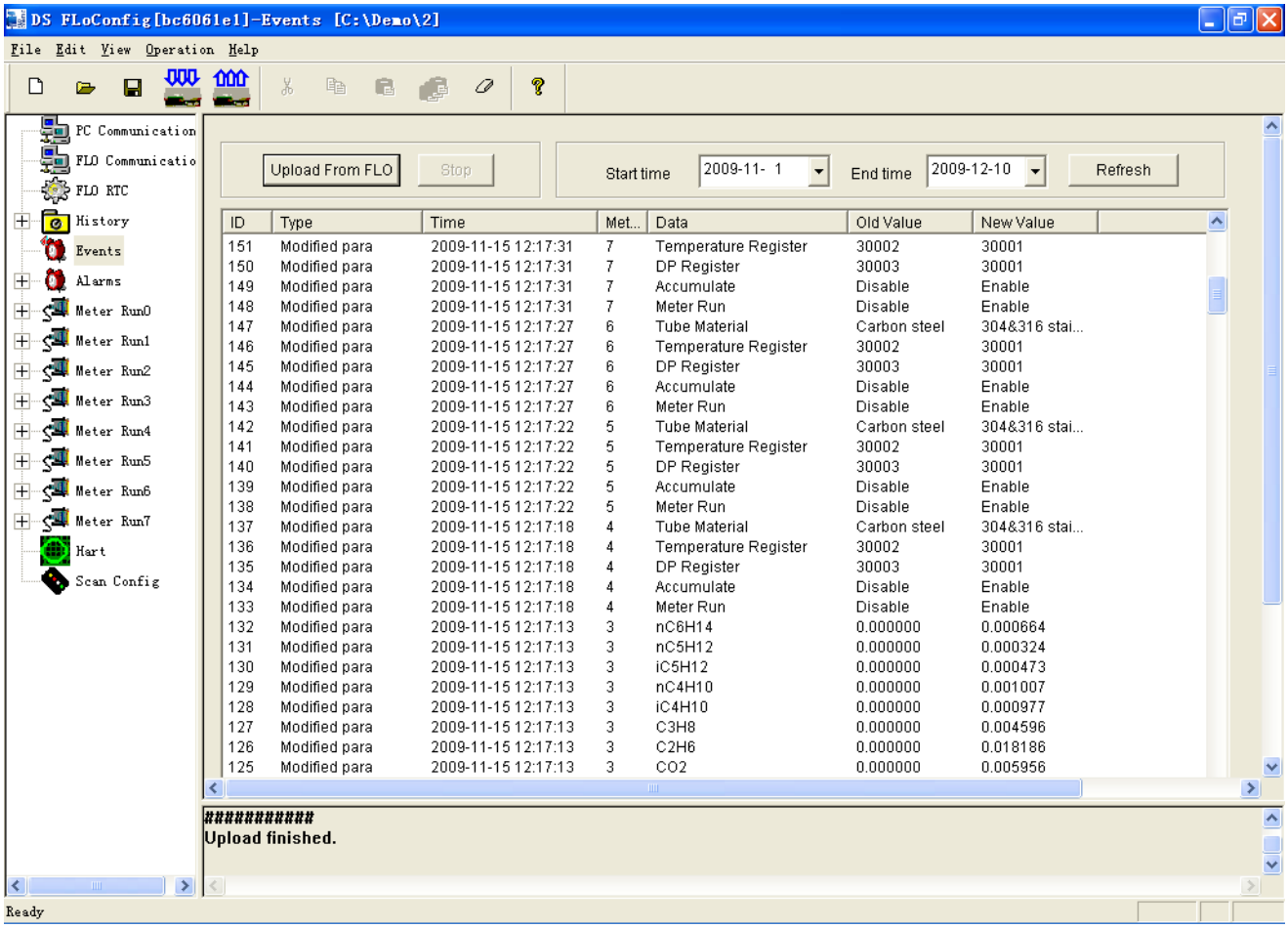
4. Click OK.

The uploading will take some time. The length of time depends on the number of event records stored on the DataSite controller.

While the uploading is in progress, some information appears in the status bar. The following is an example of the type of information displayed.

```
Start upload...
#########
Upload finished.
```

The following is an example display of event records after they are uploaded from the DataSite controller.


DS FLoConfig[bc6061e1]-Events [C:\Demo\2]
File Edit View Operation Help
PC Communication
FLO Communicatio
FLO RTC
History
Events
Alarms
Meter Run0
Meter Run1
Meter Run2
Meter Run3
Meter Run4
Meter Run5
Meter Run6
Meter Run7
Hart
Scan Config
Upload From FLO
Stop
Start time
2009-11- 1
End time
2009-12-10
Refresh
ID Type Time Met... Data Old Value New Value
151 Modified para 2009-11-15 12:17:31 7 Temperature Register 30002 30001
150 Modified para 2009-11-15 12:17:31 7 DP Register 30003 30001
149 Modified para 2009-11-15 12:17:31 7 Accumulate Disable Enable
148 Modified para 2009-11-15 12:17:31 7 Meter Run Disable Enable
147 Modified para 2009-11-15 12:17:27 6 Tube Material Carbon steel 304&316 stai...
146 Modified para 2009-11-15 12:17:27 6 Temperature Register 30002 30001
145 Modified para 2009-11-15 12:17:27 6 DP Register 30003 30001
144 Modified para 2009-11-15 12:17:27 6 Accumulate Disable Enable
143 Modified para 2009-11-15 12:17:27 6 Meter Run Disable Enable
142 Modified para 2009-11-15 12:17:22 5 Tube Material Carbon steel 304&316 stai...
141 Modified para 2009-11-15 12:17:22 5 Temperature Register 30002 30001
140 Modified para 2009-11-15 12:17:22 5 DP Register 30003 30001
139 Modified para 2009-11-15 12:17:22 5 Accumulate Disable Enable
138 Modified para 2009-11-15 12:17:22 5 Meter Run Disable Enable
137 Modified para 2009-11-15 12:17:18 4 Tube Material Carbon steel 304&316 stai...
136 Modified para 2009-11-15 12:17:18 4 Temperature Register 30002 30001
135 Modified para 2009-11-15 12:17:18 4 DP Register 30003 30001
134 Modified para 2009-11-15 12:17:18 4 Accumulate Disable Enable
133 Modified para 2009-11-15 12:17:18 4 Meter Run Disable Enable
132 Modified para 2009-11-15 12:17:13 3 nC6H14 0.000000 0.000664
131 Modified para 2009-11-15 12:17:13 3 nC5H12 0.000000 0.000324
130 Modified para 2009-11-15 12:17:13 3 iC5H12 0.000000 0.000473
129 Modified para 2009-11-15 12:17:13 3 nC4H10 0.000000 0.001007
128 Modified para 2009-11-15 12:17:13 3 iC4H10 0.000000 0.000977
127 Modified para 2009-11-15 12:17:13 3 C3H8 0.000000 0.004596
126 Modified para 2009-11-15 12:17:13 3 C2H6 0.000000 0.018186
125 Modified para 2009-11-15 12:17:13 3 CO2 0.000000 0.005956
############
Upload finished.
Ready

An alternative method of retrieving the event records is by using the toolbar:

1. From the Start Time pull-down menu, choose the start time for the event records.



2. From the End Time pull-down menu, choose the end time.
3. Click Refresh.

Sort Event Records

You can sort the records by clicking the column headings. For example, if you click the Time column heading once, the records will be sorted in chronological order. Clicking the column headings more than once will toggle the sort order. For example, if you click the Time column heading again, the records will be sorted in reverse chronological order.

The following is an example of event records sorted in chronological order:

ID	Type	Time	Meter Run	Data	Old Value	New Value
192	Sys Event	2009-10-08 16:56:12		Power on		
191	Sys Event	2009-10-08 16:56:05		Power off		
190	Sys Event	2009-10-08 15:27:57		Power on		
189	Sys Event	2009-10-08 15:27:49		Power off		
188	Sys Event	2009-09-28 08:48:34		Power on		
187	Sys Event	2009-09-28 08:48:27		Power off		
186	Modified para	2009-09-27 14:10:47	0	Contract standard ref-ratio temperature	60.000000	68.000000

To display the records in unsorted order, click Refresh.

Understand the Event Record Format

An event record consists of the following components:

- ID: the serial number of the alarm record. The range of the ID is 0…65535. Once the number of records exceeds 65535, the ID starts from 0 again.
- Type: See the section, Event Types on page 176.
- Time: the date and time that the record is created. The date is in the format, year-month-day, and time is in the format, hour:minute:second.
- Meter Run: flow meter channels 0…7.
  The Meter Run column does not apply to system events.
- Data: the events that have occurred.
- Old value: previous data associated with the event.
  The Old Value column does not apply to system events.
- New value: new data associated with the event
  The New Value column does not apply to system events.

Event Types

This table provides a list of system events and their descriptions.

Descriptions of system events

System Event	Condition
Power On	When the DataSite controller powers on.
Power Off	When the DataSite controller powers down.
Contract Time	When the contract time in the DataSite controller changes.
Watchdog Reset	When the DataSite controller's watchdog is reset.
RTC Date	When the RTC date of the DataSite controller is calibrated.
RTC Time	When the RTC time of the DataSite controller is calibrated.

This table provides a list of parameter modification events and their descriptions.

Descriptions of parameter modification events

Parameter modification event	Condition
Meter Run	When the meter run is enabled or disabled.
Unit Type	When the unit type (U.S. or Metric) is changed.
Accumulate	When the flow meter is set to start or stop accumulation.
Automatic Components	When the Automatic Components option is selected or deselected.
AGA Standard	When the flow calculation standard is changed.
AGA8 Method	When the compressibility calculation method is changed.
Calculation Interval	When the calculation interval is changed.
BMP (Base Multiplier Period)	When the BMP is changed.
Base Pressure	When the base pressure is changed.
Base Temperature	When the base temperature is changed.
DP Cutoff	When the differential pressure cutoff is changed.
Pressure Type	When the pressure type is selected.
Atmospheric Pressure	When the atmospheric pressure is changed.
Static Pressure Tap Location	When the location of pressure tap is selected.
Orifice Material	When the orifice plate material is selected.
Orifice Diameter	When the diameter of the orifice plate is changed.
Orifice Measurement Reference Temperature	When the orifice measurement reference temperature is changed.
Tube Material	When the tube material is selected.
Tube Diameter	When the diameter of the tube is changed.
Tube Measurement Reference Temperature	When the tube measurement reference temperature is changed.
Relative Density Condition Type	When the relative density condition type is set as “Real” or “Ideal”.
Relative Density	When the relative density is changed.
Reference P for Relative Density	When the reference pressure for relative density is changed.
Reference T for Relative Density	When the reference temperature for relative density is changed.
Gas Heating Value	When the gas heating value is changed.
Reference T for Gas Heating Value	When the reference temperature for the gas heating value is changed.
Pressure Register	When the pressure register is changed.

Descriptions of parameter modification events (Continued)

Parameter modification event	Condition
Pressure Data Type	When the pressure data type is selected.
Pressure K Factor	When the pressure K factor is changed.
Pressure B Factor	When the pressure B factor is changed.
Temperature Register	When the temperature register is changed.
Temperature Data Type	When the temperature data type is selected.
Temperature K Factor	When the temperature K factor is changed.
Temperature B Factor	When the temperature B factor is changed.
DP Register	When the DP register is changed.
DP Data Type	When the DP data type is selected.
DP K Factor	When the DP k factor is changed.
DP B Factor	When the DP b factor is changed.
Pulse Register	When the pulse register is changed.
Pulse K Factor	When the pulse k factor is changed.
CH4	When the percentage level of the methane component is changed.
N2	When the percentage level of the nitrogen component is changed.
CO2	When the percentage level of the carbon dioxide component is changed.
C2H6	When the percentage level of the ethane component is changed.
C3H8	When the percentage level of the propane component is changed.
H20	When the percentage level of the water component is changed.
H2S	When the percentage level of the hydrogen sulfide component is changed.
H2	When the percentage level of the hydrogen component is changed.
CO	When the percentage level of the carbon monoxide component is changed.
O2	When the percentage level of the oxygen component is changed.
iC4H10	When the percentage level of the i-butane component is changed.
nC4H10	When the percentage level of the n-butane component is changed.
iC5H12	When the percentage level of the i-pentane component is changed.
nC5H12	When the percentage level of the n-pentane component is changed.

Descriptions of parameter modification events (Continued)

Parameter modification event	Condition
nC6H14	When the percentage level of the n-hexane component is changed.
nC7H16	When the percentage level of the n-heptane component is changed.
nC8H18	When the percentage level of the n-octane component is changed.
nC9H20	When the percentage level of the n-nonane component is changed.
nC10H22	When the percentage level of the n-decane component is changed.
HE	When the percentage level of the helium component is changed.
AR	When the percentage level of the argon component is changed.
Pulse Cutoff	When the pulse cutoff is changed.
Interval for Collecting components analysis instrument	When the the interval is changed

Calibrate the Meter Sensor

The Meter Calibration function allows you to maintain continuous measurement of the flow rate by the flow meter while calibrating field sensors. You can do this by sending forced signals to the flow meter to replace the field signals from the sensors.

You need to calibrate the meter sensor in the following situations:

- when the sensor does not work but the meter is required to accumulate measurements continuously.
- when the sensor needs to be checked for its accuracy.

Open the Force Signals dialog box

Follow this step to open the Force Signals dialog box.

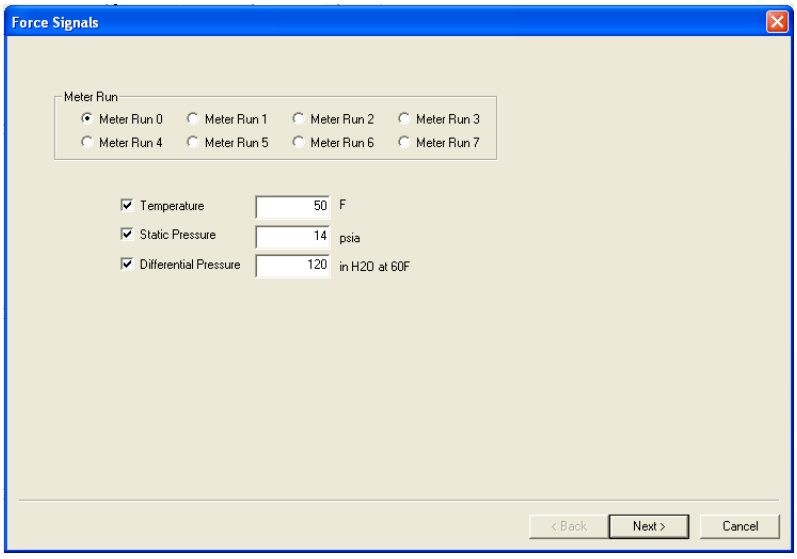
- From the Operation menu, choose Meter Calibration.

  The Force Signals dialog box appears.

Set Forced Values for Field Signals

Follow these steps to set forced values for the field signals you want to calibrate.

1. In the Force Signals dialog box, select the meter run.



2. Select the check box for the field signal(s).

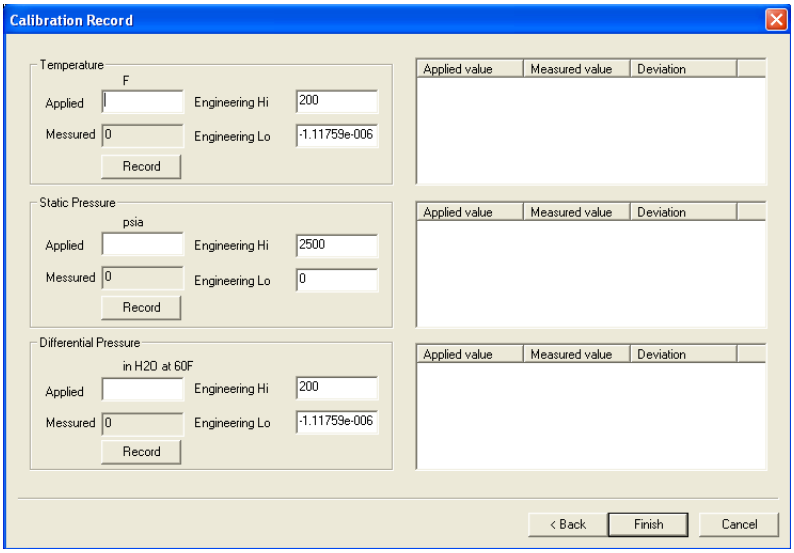
   You may select more than one signal for calibration.

3. Enter the forced values for the selected signals in the corresponding boxes.

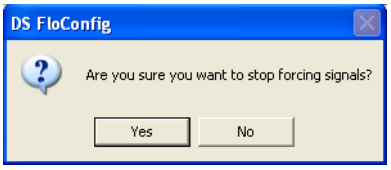
TIP The forced values should be as close as possible to the average value of the field signals.

4. Click Next.

The Calibration Record dialog box appears.



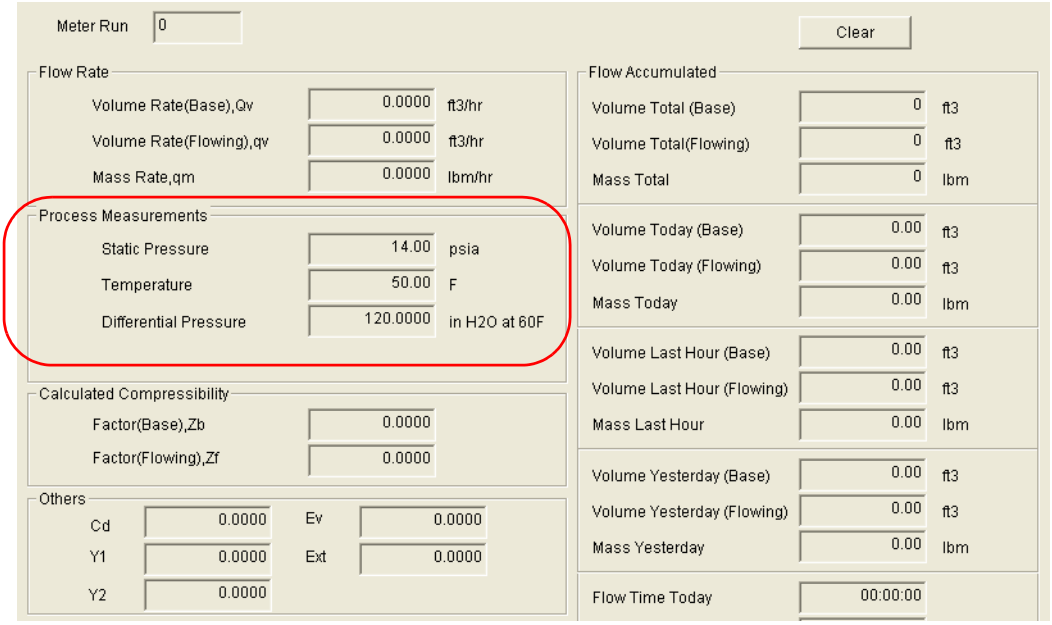
If you want to calculate with forced values only, click Finish. The following dialog box appears.



5. To save the forced values, click No.
   If you click Yes, the forced values will be discarded and calculation with forced values will be disabled.

   For example, after entering the values shown in step 1 for meter run 0, the Meter Run0 window will display the forced values and calculate the flow rate based on these values. You need to select the Meter Run and Accumulate check boxes, and configure all the parameters required for gas flow calculation, such as the gas component parameters.

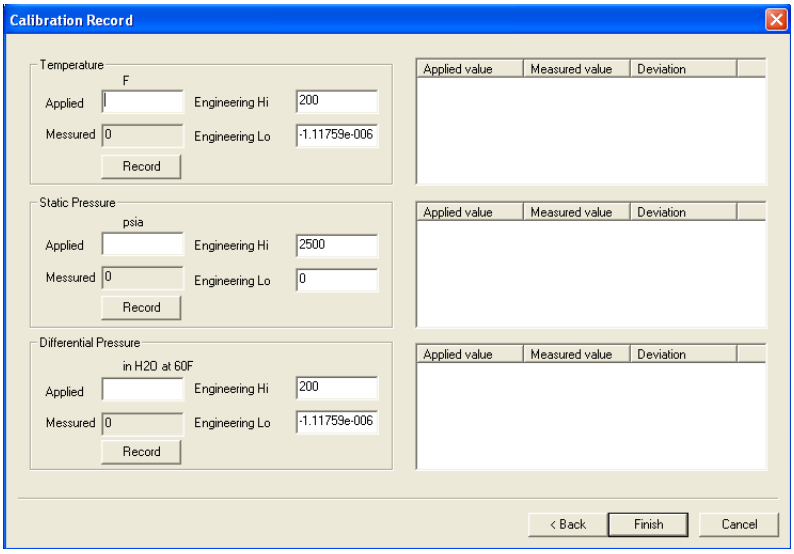
   The forced values should be as close as possible to the average value of the field signals. The system will calculate flow rate based on these forced values.



Calibrate the Sensors

Follow these steps to calibrate the sensors.

1. Apply a known signal to the sensor.
2. In the Calibration Record dialog box, enter the applied value in the Applied box.



3. In the Engineering Hi box, enter the upper limit of the value range for this sensor.
4. In the Engineering Lo box, enter the lower limit of the value range for this sensor.
5. Wait until the measured value is stable, and then click Record.

   This records the group of data and the system will calculate the deviation of the applied value against the measured value.

   The deviation is calculated as follows:
   Deviation = (measured-applied)/(Engineering Hi-Engineering Lo)*100%
6. You may repeat this process.

IMPORTANT When calibrating a pulse signal, the forced pulse value must be set to the pulse number per second. In addition, the measured value and the field applied value should also be the total number of pulses.

Complete the Calibration

Follow these steps to complete the calibration.

1. After the calibration process ends, click Finish.

   The system will ask you if you want to stop using forced signal values.

2. If you want the flow calculation to return to using the live single inputs from the sensors, click Yes.
   If you want the controller to continue using the forced values, click No.
   If you want to exit without stopping the forced signals, click Cancel.

Initialize the Controller

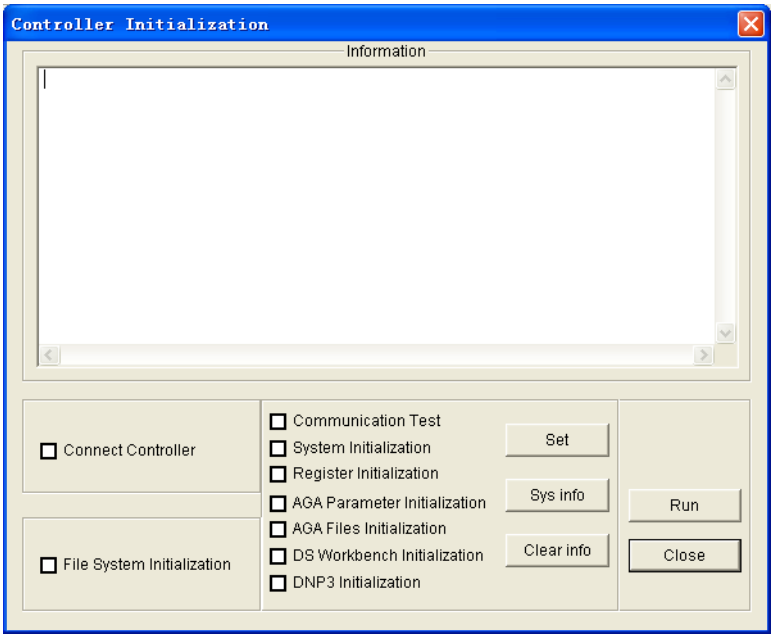
Use the Controller Initialization function to initialize the DataSite controller.

Open the Controller Initialization dialog box

Follow this step to open the Controller Initialization dialog box.

- From the Operation menu, choose Controller Initialization.

  The Controller Initialization dialog box appears.



Switch Controller into Service Mode

To initialize the controller, you must set the controller into the Service mode first.

Follow these steps to set the controller into the Service mode.

1. Power down the DataSite controller.
2. Use a serial communication cable to connect one PC serial port with the COM2 of the controller.

IMPORTANT Only COM2 can be used.

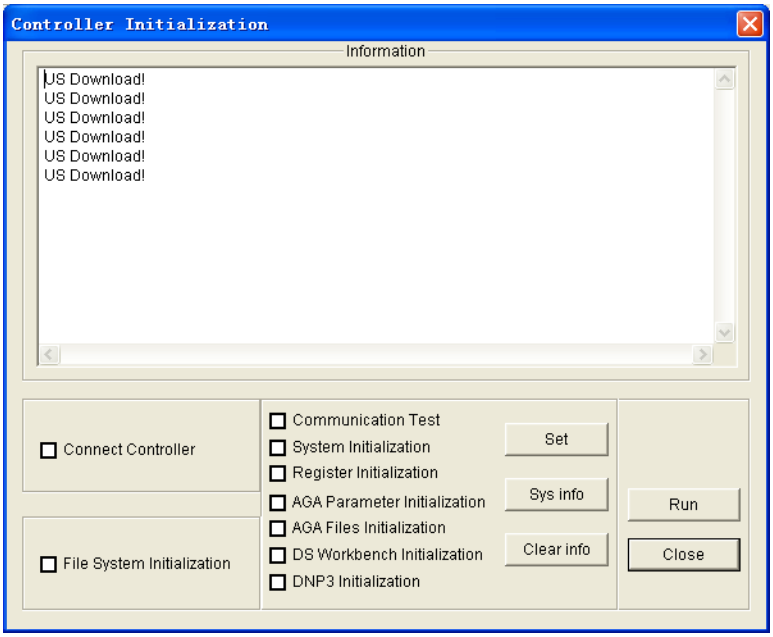
3. From the Operation menu, choose Controller Initialization.

   The Controller Initialization dialog box appears.

4. Select the Connect Controller check box.

5. Power off and power on the controller.

6. When "US Download!" appears in the Information box, clear the Connect Controller check box.



The DataSite controller has successfully gone into the Service mode.

Test the Communication

Follow these steps to obtain the communication settings of the DataSite controller. This function can help you retrieve the communication parameter settings if you forget or lose them.

1. Set the controller into the Service mode.
2. Select the Communication Test check box.
3. Click Set.

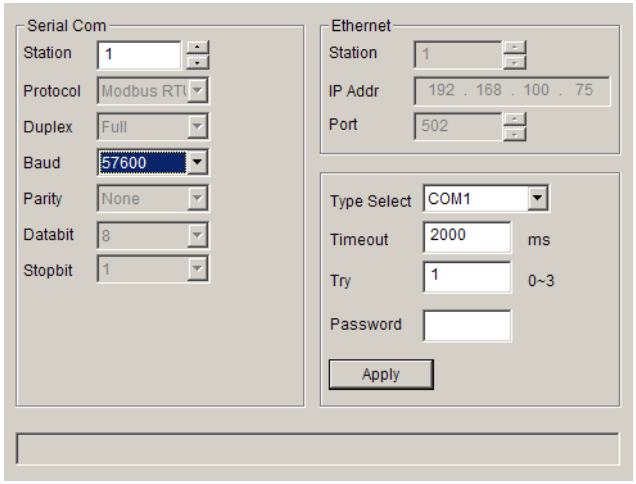
   All settings will be downloaded into the controller.
4. Click Run followed by Close.

   The controller goes into the Communication Test mode. The communication parameters of COM2 are set to be test parameters. This table lists the communication test parameters.

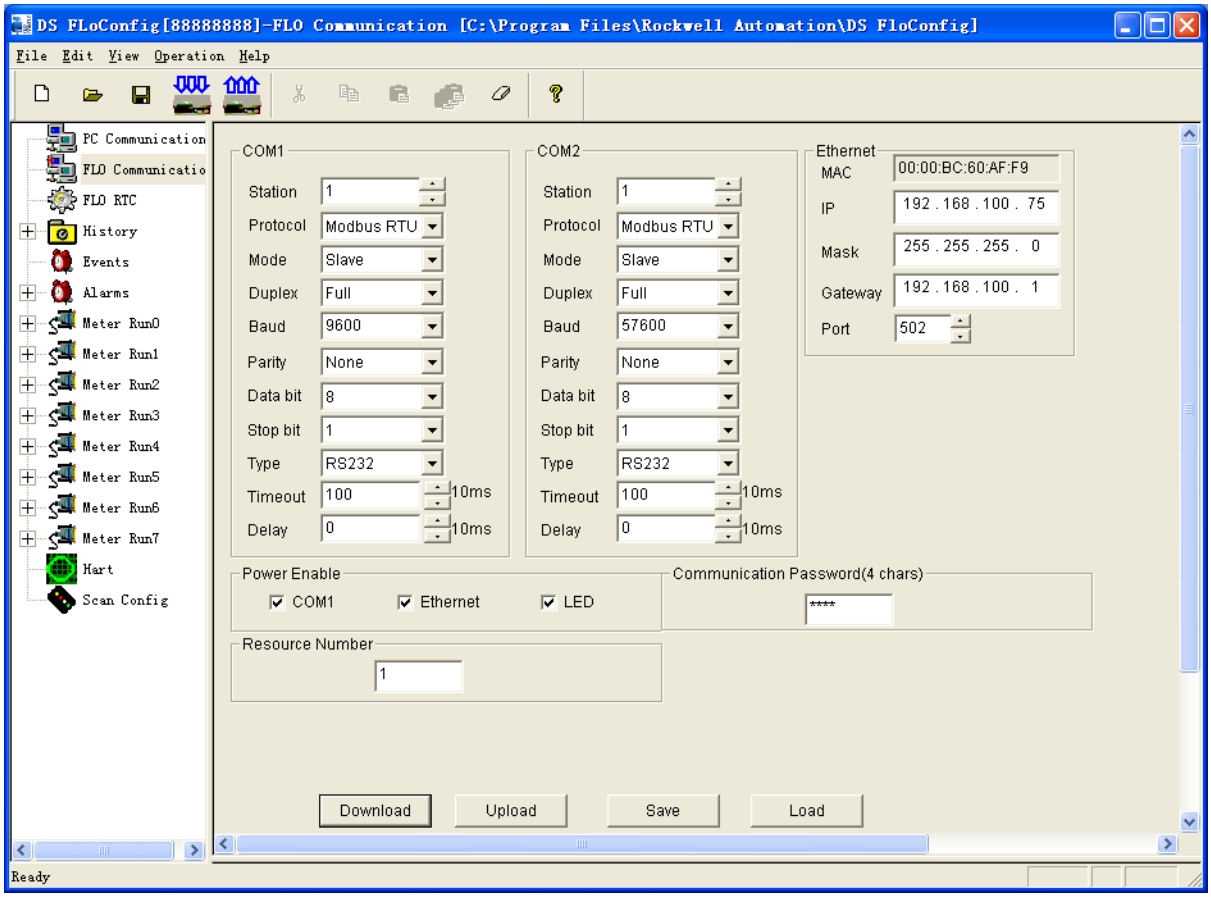
COM2 communication test parameters

Parameter Name	Parameter Value
Station	1
Protocol	Modbus RTU
Master/Slave State	Slave
Duplex	Full
Baud rate (bps)	57600
Parity	None
Data bits	8 bits
Stop bits	1 bit
Port type	RS232
Timeout (10 ms)	100
Delay time (10 ms)	0

5. Choose PC Communication Settings in the configuration tree, and set the PC baud rate as 57600.



6. Select FLO Communication in configuration tree.



When the upload is completed successfully, the communication settings of the controller are displayed.

7. To exit the Test Communication state, power the DataSite controller off and on again.

   Normal communication with the controller is resumed.

Reset the Communication Parameters

The following tables show the default values of the COM1, COM2 and Ethernet communication parameters:

Default values of COM1, COM2 communication parameters

Parameter Name	Default Value
Station	1
Protocol	Modbus RTU
Master/Slave State	Slave
Duplex	Full
Baud rate (bps)	9600
Parity	None
Data bits	8 bits
Stop bits	1 bit
Port type	RS232
Timeout (10 ms)	100
Delay time (10 ms)	0

Default values of Ethernet communication parameters

Parameter Name	Default Value
IP	192.168.100.75
Mask	255.255.255.0
Gateway	192.168.100.1
Port	502

Follow these steps to reset the communication parameters to their default values.

1. Set the controller into the Service mode.
2. Select the System Initialization check box.
3. Click Set.

   The new settings are downloaded to the controller.
4. Click Run, and exit the service mode.

IMPORTANT After the controller is initialized, the password you have set in the Communication Password dialog box will be reset to 0000. For instructions on how to change the password, see Change the Communication Password.

Reset the Register Values

Follow these steps to reset the register values in the controller to 0.

1. Set the controller into the Service mode.
2. Select the Register Initialization check box.
3. Click Set.

   The new settings are downloaded to the controller.
4. Click Run, and exit the service mode.

Reset the AGA Flow Parameters

The following tables show the default values of the AGA flow parameters:

Default values of AGA flow parameters

Parameter Name	Default Value
Unit	U.S.
Meter run	Disable
Accumulate	Disable
AGA Standard	AGA3

Default values of AGA flow parameters (Continued)

Parameter Name	Default Value
AGA8 Methods	Gas analysis
Calculation interval	1
BMP (Base Multiplier Period)	1
Base Pressure	14.73
Base Temperature	60
DP Cutoff	0
Pressure Type	Absolute
Atmospheric Pressure	14.73
Static Pressure Tap Location	Upstream
Orifice Material	304 and 316 stainless steel
Orifice Diameter	4
Orifice Measurement Reference Temperature	68
Tube Material	Carbon steel
Tube Diameter	8.071
Tube Measurement Reference Temperature	68
Relative Density Condition Type	Real
Relative Density	0.58122
Reference P for Relative Density	14.73
Reference T for Relative Density	60
Gas Heating Value	1035.99
Reference T for Gas Heating Value	60
Pressure Register	0
Pressure Data Type	Ushort
Pressure K Factor	0.0625
Pressure B Factor	-625
Temperature Register	0
Temperature Data Type	Ushort
Temperature K Factor	0.005
Temperature B Factor	-50
DP Register	0
DP Data Type	Ushort
DP K Factor	0.005
DP B Factor	-50
Pulse Register	0
Pulse Data Type	Ushort
Pulse K Factor	0.005

Default values of AGA flow parameters (Continued)

Parameter Name	Default Value
CH4	0.965222
N2	0.002595
CO2	0.005956
C2H6	0.018186
C3H8	0.004596
H20	0
H2S	0
H2	0
CO	0
O2	0
iC4H10	0.000977
nC4H10	0.001007
iC5H12	0.000473
nC5H12	0.000324
nC6H14	0.000664
nC7H16	0
nC8H18	0
nC9H20	0
nC10H22	0
HE	0
AR	0
Pulse Cutoff	0

Follow these steps to reset all the AGA flow parameters to their default values.

1. Set the controller into the Service mode.
2. Select the AGA Parameter Initialization check box.
3. Click Set.

   The new settings are downloaded to the controller.
4. Click Run, and exit the service mode.

Rebuild the AGA Files

Follow these steps to clear all the history and event records.

1. Set the controller into the Service mode.
2. Select the AGA File Initialization check box.
3. Click Set.

   All the history and event records are cleared.
4. Click Run, and exit the service mode.

Delete the DataSite Workbench Program

Follow these steps to delete the DataSite Workbench program that is on the DataSite controller.

1. Set the controller into the Service mode.
2. Select the DS Workbench Initialization check box.
3. Click Set.

   The DataSite Workbench program is deleted from the DataSite controller.
4. Click Run, and exit the service mode.

Clear the DNP3 Parameters

Follow these steps to clear the values of the DNP3 parameters.

1. Set the controller into the Service mode.
2. Select the DNP3 Initialization check box.
3. Click Set.

   The DNP3 parameter settings are deleted from the DataSite controller.
4. Click Run, and exit the service mode.

Initialize the File System

The File System Initialization option lets you do the following:

- Clear all the parameter settings made in DS Settings, for example, Scan block, HART scan block and PID block settings.
- Clear DNP3 parameters
- Clear registers

This is equivalent to selecting the following check boxes:

- Register Initialization
- DNP3 Initialization
- DS Workbench initialization

Follow these steps to initialize the file system.

1. Set the controller into the Service mode.
2. Select the File System Initialization check box.

   TIP When the File System Initialization check box is selected, the AGA Parameter Initialization, AGA Files Initialization, DS Workbench Initialization and DNP3 Initialization check boxes are cleared. This is because the File System Initialization function includes these other functions.

3. Click Set.

   The new settings are downloaded to the controller.

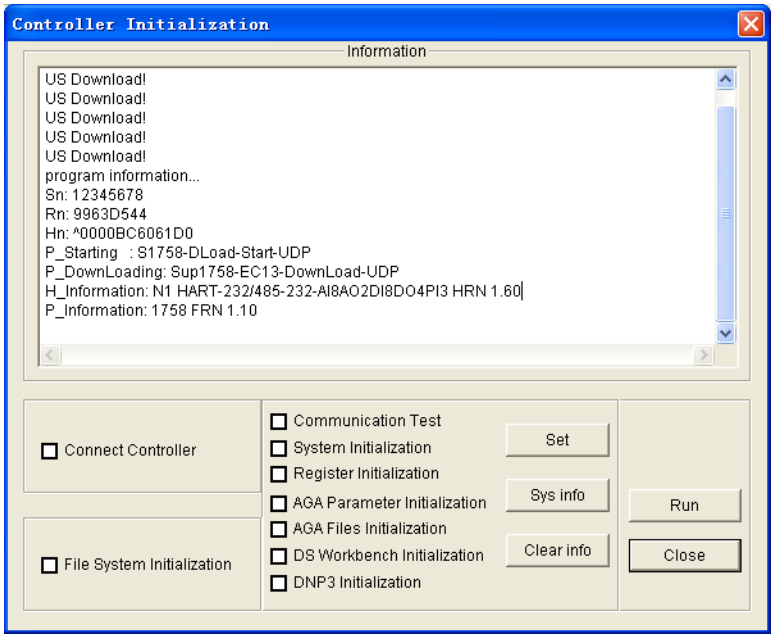
4. Click Run, and exit the service mode.

Display System Information

Follow these steps to check the basic factory information of the DataSite controller.

1. Set the controller into the Service mode.
2. Click Sys info.

   Basic factory information on the DataSite controller appears in the Information box.



3. Click Run.
4. Click Close and then exit the Service mode.

Clear Status Message

Follow this step to clear all the status messages in the Information box.

- Click Clear info.

Configure the Scan Settings

For integrated modules such as the DataSite controller, the master ports can directly read/write parameters by accessing the fixed Modbus registers. We need to set scan blocks of US1 and US2 only when we want to access other pieces of equipment connected with the two serial ports (COM1, COM2).

Use Scan Settings to match the register addresses of the 1758 controller with those of the serially connected equipment.

Understand the Scan Blocks

Every scan block corresponds to a scan task. The maximum number of scan tasks is 128. This table lists the description of each item in a scan block.

Scan block parameters and their descriptions

Scan Block Parameter	Description
Block type	Scan block data category
Address	Modbus slave station number of serial communication equipment connected with COM1 or COM2.
Signal type	Signal register category
Scan time	Read/Write interval
Master Register	Register address where data is saved in the controller, decided by the user.
Slave Register	You can set the read/write data register address of the slave communication equipment according to the parameter form of the slave communication equipment register.
Reg_Num	The number of read/write data registers.
Err_Cnt	The number of times the scan block fails to communicate.
Err_State	Scan block communication state. If the Err_State value is 1, it means the communication has failed. A value of 0 indicates that the communication is OK.
Remark	User comments. You can enter a note or a tip for the scan block. Note that this field will not be downloaded to the DataSite controller.

Block Type

The block type indicates the category of scan block data.

Scan block types and their descriptions

Name	Function
US1 block	1758-RTU controller Read-write data of the serial equipment connected with the serial port COM1.
US2 block	1758-RTU controller Read-write data of the serial equipment connected with the serial port COM2.

Scan blocks are configured in sequence, and every block has a corresponding number. The maximum number of block numbers is 128.

When the type of a block is Empty Block, its subsequent block configuration is invalid.

Address

For 1758-RTU controller, this means the Modbus slave station number of the serial communication equipment connected with COM1 or COM2.

The range of the Modbus slave station number is 1…247.

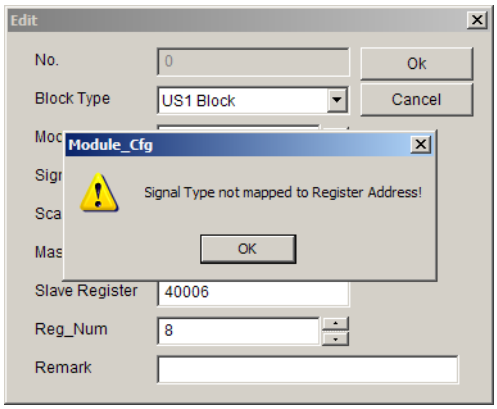
Signal Type

The signal type indicates the category of register read/write signal, and its contents.

Signal types and functions

Signal Type	Function	Modbus Command
Read_Coil register	Read 00001…04096 register	1
Read_State register	Read 10001…14096 register	2
Read_Hold register	Read 40001…49999 register	3
Read_Input register	Read 30001…31024 register	4
Write_1Coil register	Write 00001…04096 register	5
Write_1Hold register	Write 40001…49999 register	6
Write_nCoil register	Write 00001…04096 register	15
Write_nHold register	Write 40001…49999 register	16

When the address of the master or slave register does not map to the signal, the following error will appear.



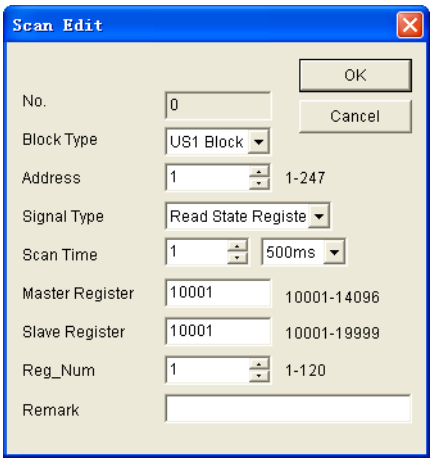
Scan Time

Scan time refers to the read-write time interval of a scan block. You can use the trigger scan function for COM port by programming the function block COM_MSG in DataSite Workbench.

The following units of time are available. Note that ms represents milliseconds, s seconds, m minutes, and h hours:

- 50 ms
- 500 ms
- 5 s
- 50 s
- 5 m
- 50 m
- 5 h
- 50 h

The scan time is equal to the value multiplied by the unit selected. For example, if the value entered is "3" and the unit selected is "500 ms", then the scan time is 3 x 500 ms = 1500 ms as shown in the following dialog box. This means that the current scan block will be executed every 1500 ms.



Scanning starts when the DataSite controller is powered, and it continues according to the scan time you have set.

Master Register

This is the start address of the register on the DataSite controller. Data is saved into the master register starting from this address. The address range is determined by the signal type.

Slave Register

This is the start address of the register on the slave equipment for reading data from and writing data to. The controller will read data from or write data to the slave equipment from this address. The address range is determined by the signal type.

Reg_Num

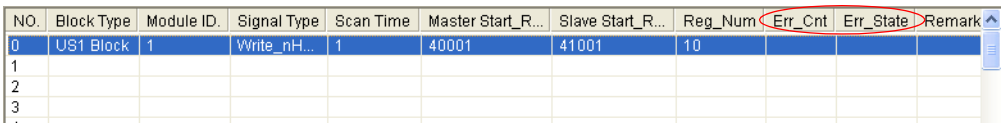
The number of read/write data registers that follow the start register address of the master register and the slave register. For example, if Reg_Num is 10, the Master Register is 40001 and the Slave Register is 41001, this means there are 10 master registers with register addresses running sequentially from 40001…40010, and 10 slave registers with register addresses 41001…41010.

Remark

This field lets you enter a note or a tip for the scan block. This information can be saved onto the PC but unlike other parameters, it will not be downloaded to the DataSite controller. The maximum string length for this field is 90 characters.

Err_Cnt and Err_State

These two parameters do not require user configuration. If you set up a scan block successfully, two columns for these parameters will be added in the scan block list automatically.



NO.	Block Type	Module ID.	Signal Type	Scan Time	Master Start_R...	Slave Start_R...	Reg_Num	Err_Cnt	Err_State	Remark
0	US1 Block	1	Write_nH...	1	40001	41001	10			
1										
2										
3										

The Err_Cnt value represents the number of times the scan block fails to communicate with the slave device. After the scan block is configured, if there is no connection with the slave device or if communication fails, this value will be incremented by 1 after each scan cycle.

This value is an indication of the status and efficiency of the communication. For example, if the value keeps incrementing, this means that the communication has failed. This could be due to a faulty physical connection between the DataSite controller and the slave device, or due to incorrect parameter settings. In addition, a low value indicates a more efficient communication.

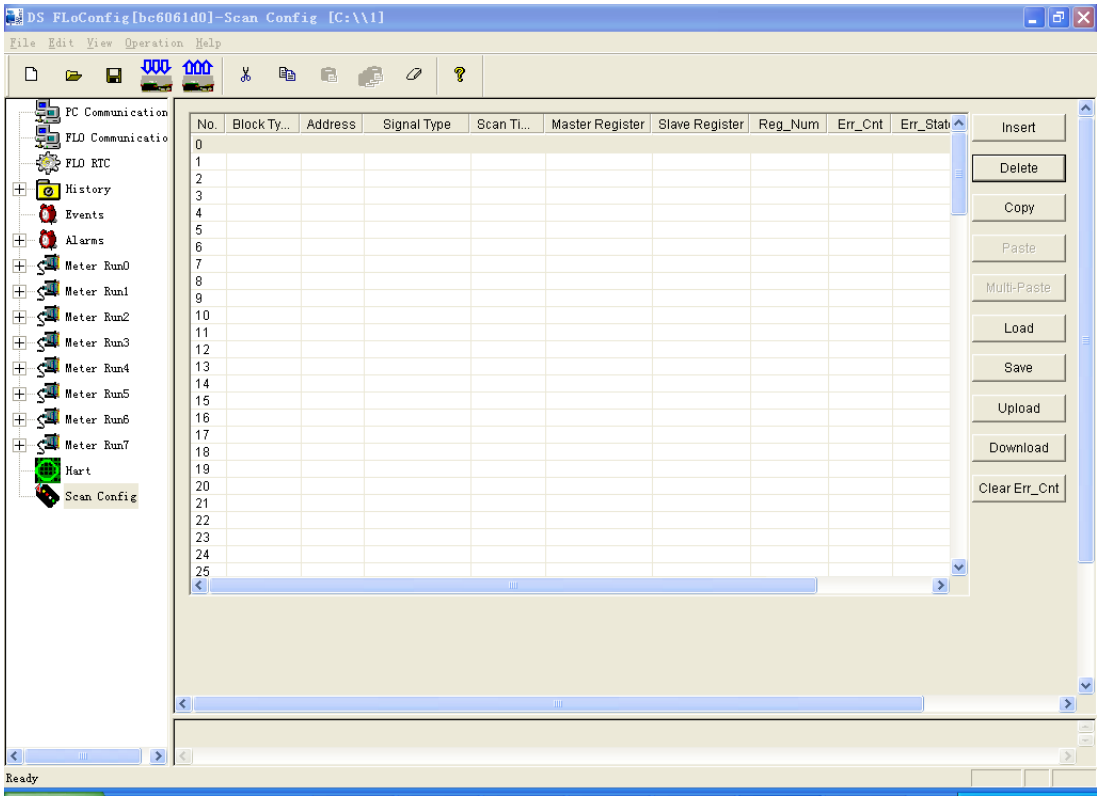
If the Err_State value is 1, it means the communication has failed. A value of 0 indicates that the communication is OK.

Open the Scan Settings Dialog Box

Follow these steps to open the Scan Settings dialog box.

- In the configuration tree, click Scan Config.

The Scan Config window appears.

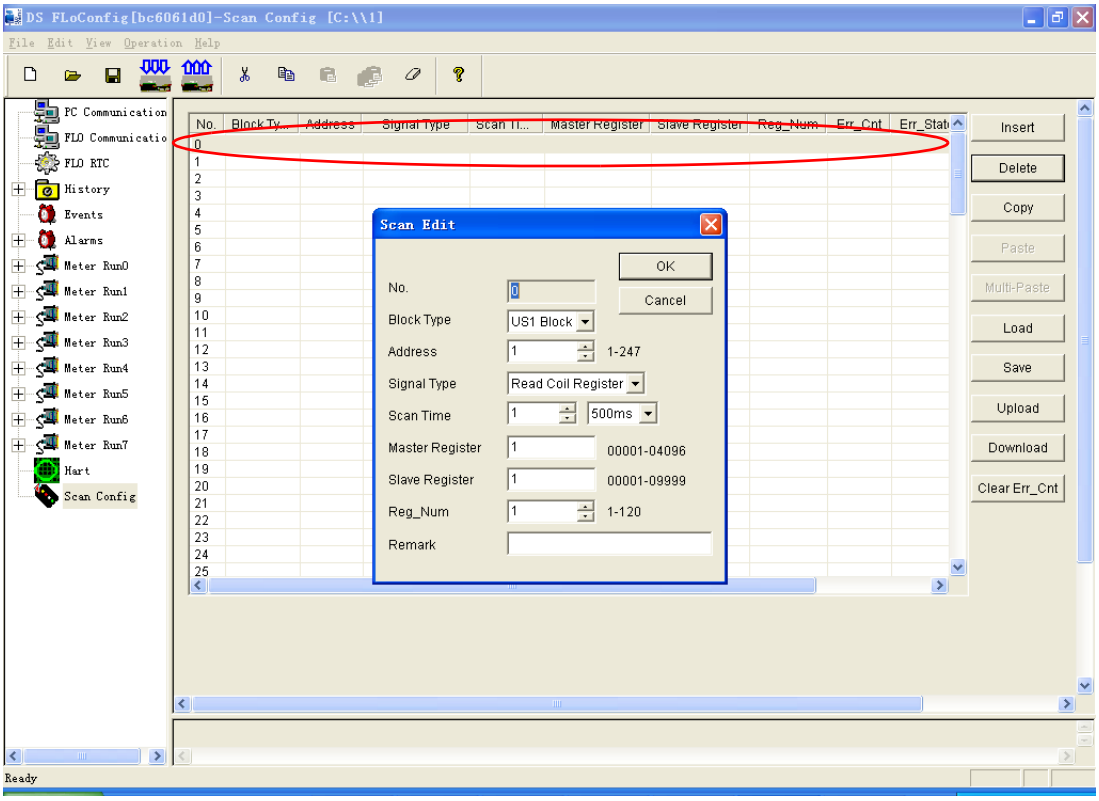


Edit a Scan Block

Follow these steps to edit a scan block.

1. In the Scan Config window, double-click the scan block you want to edit.

   The Edit dialog box appears.



2. Enter the values for the scan block parameters.
   See the table Scan block parameters and their descriptions on page 196.

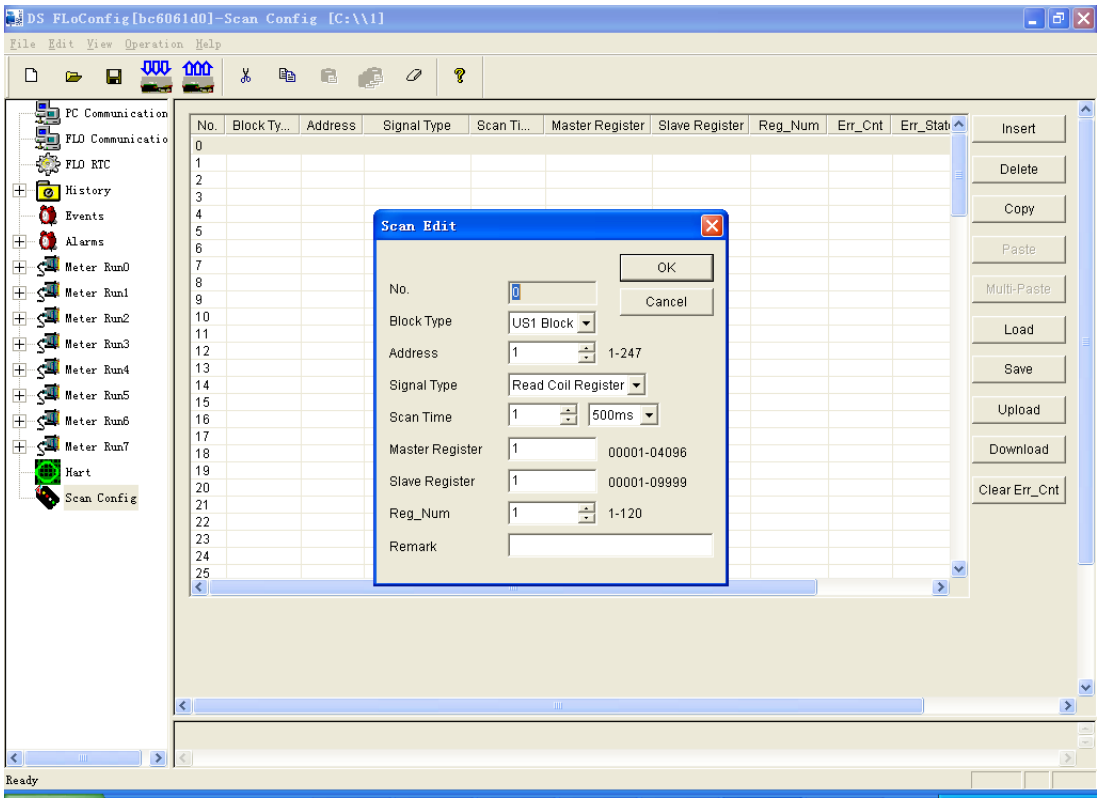
3. To save the changes and close the Edit dialog box, click OK.
   To close the Edit dialog box without saving, click Cancel.

Insert a Scan Block

Follow these steps to insert a scan block.

1. In the Scan Config window, select a scan block.
2. Click Insert.

   The Scan Edit dialog box appears.



3. Enter the values for the scan block in the Scan Edit dialog box.
4. To save the changes and close the Edit dialog box, click OK.
   To close the Edit dialog box without saving, click Cancel.

Delete a Scan Block

Follow these steps to delete a scan block.

1. Select the block you want to delete.
2. Click Delete.

A dialog box prompting you to confirm the deletion appears.

3. To confirm the deletion, click OK.
   To cancel the deletion, click Cancel.

Copy a Scan Block

Follow these steps to copy a scan block.

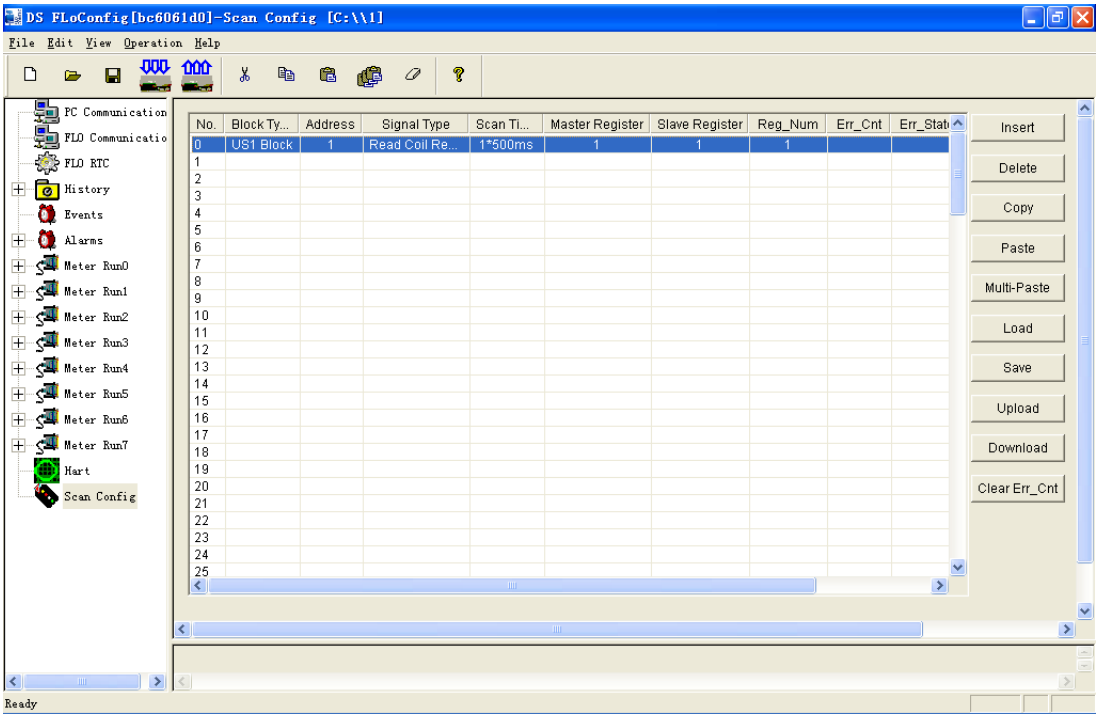
1. Select the block you want to copy.
2. Click Copy.

   The selected scan block is copied.

Paste a Scan Block

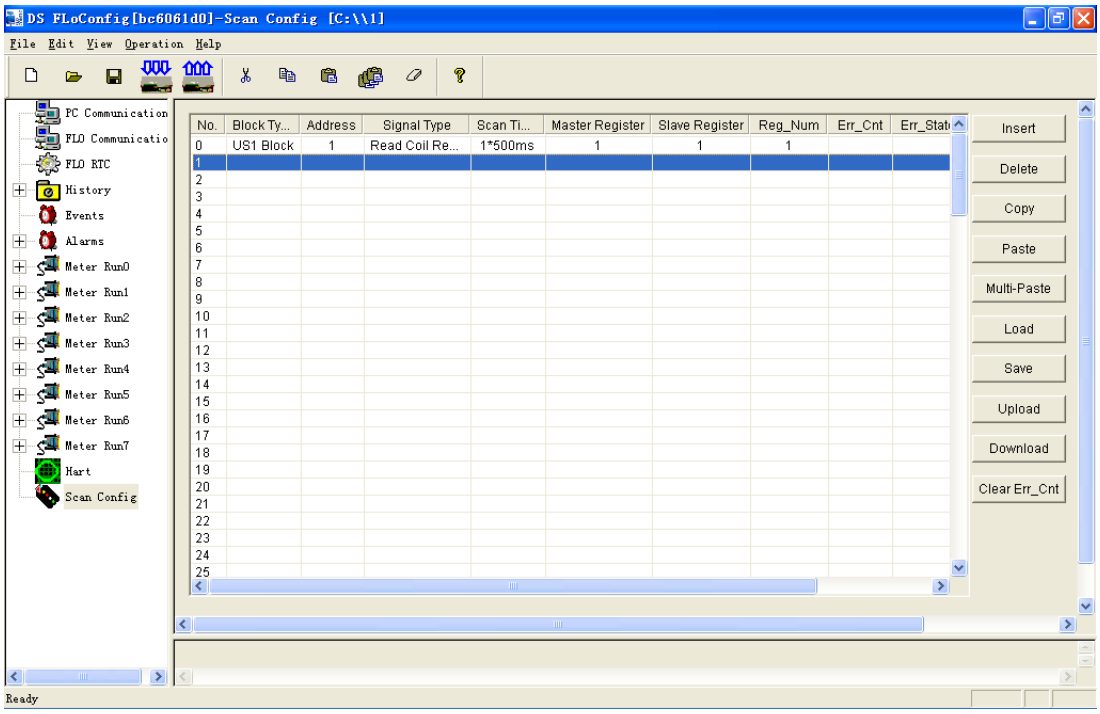
Follow these steps to paste a block.

1. Select the block you want to copy and paste.
2. Click Copy to copy the block.

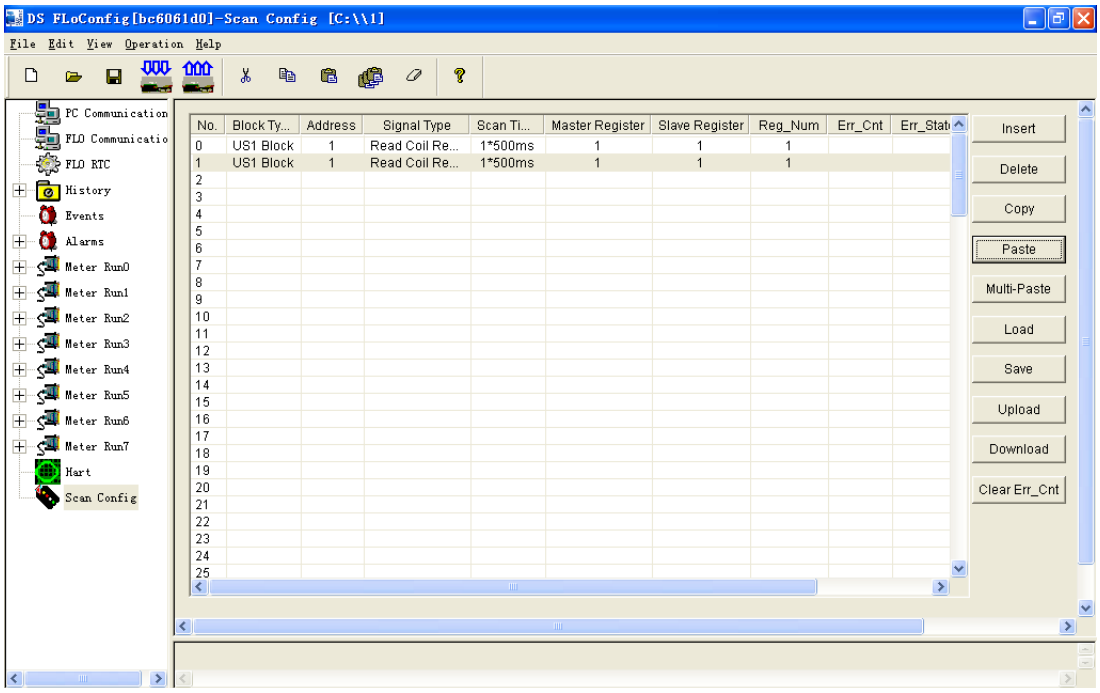


3. Select the row you want to paste the copied block to.

TIP You can only select an empty row that is right after the selected block, or a row that already contains a block.



4. Click Paste to paste the copied block.



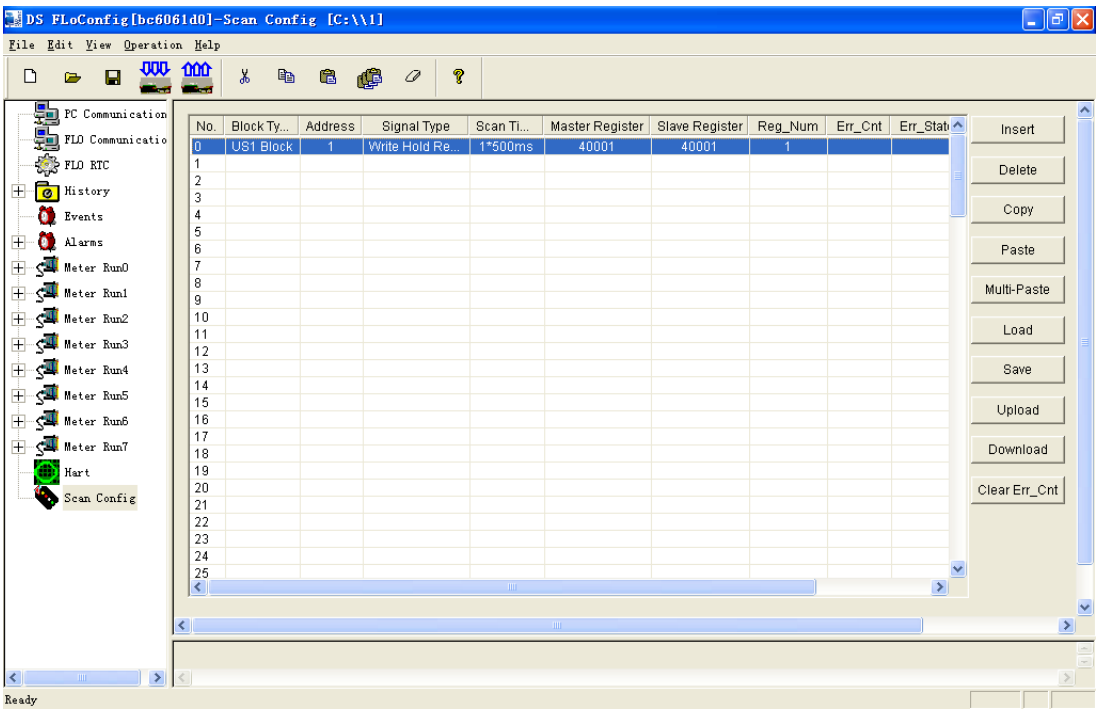
If you want to paste over a row that already contains a block, the new scan block will be added automatically after the last scan block.

Paste a Scan Block to Multiple Rows

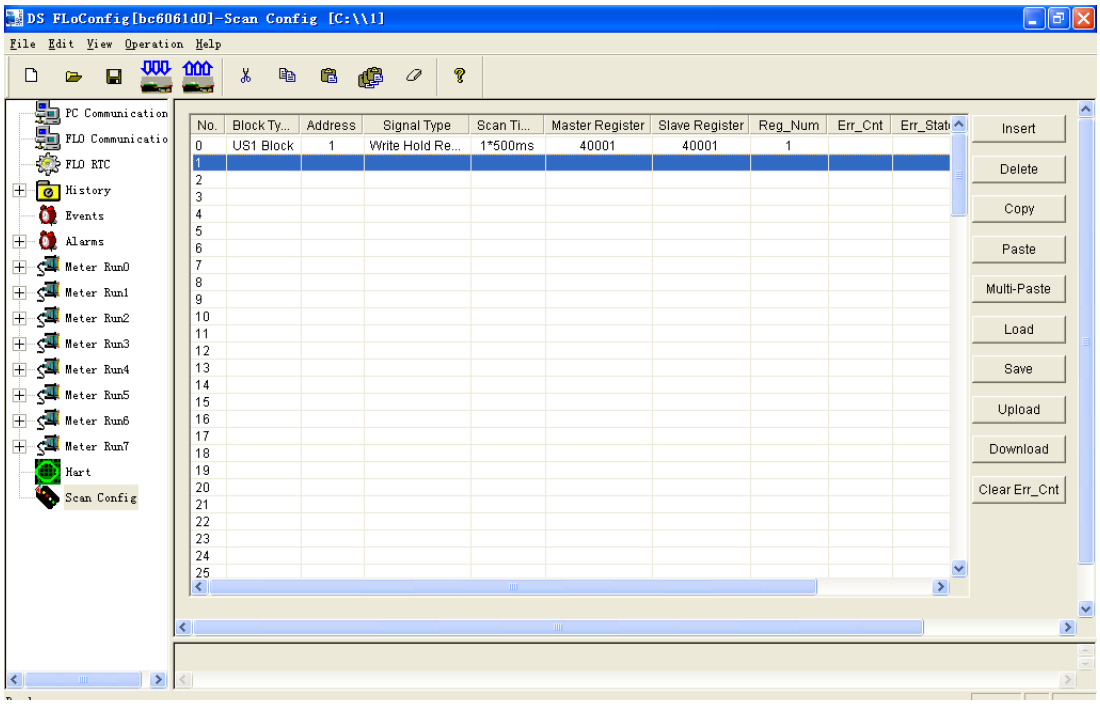
The Multi_Paste function allows you to paste a copied block to multiple rows.

Follow these steps to paste a copied block to multiple rows.

1. Select the block you want to copy and paste.
2. Click Copy to copy the block.

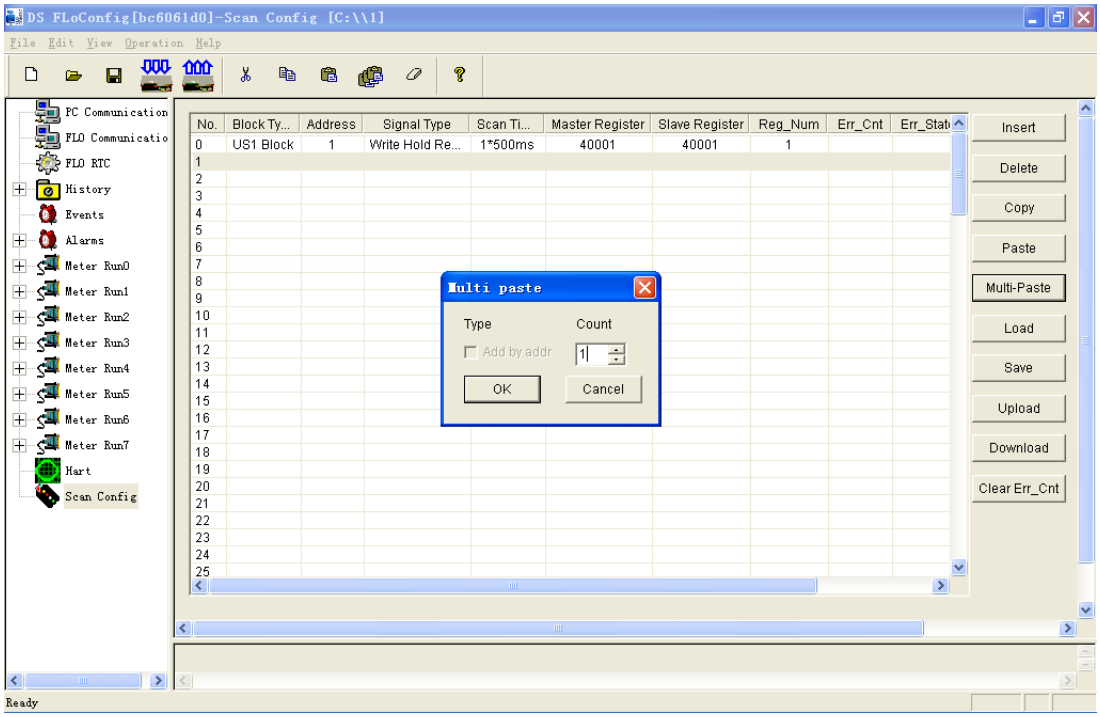


3. Select the *first* row you want to paste the copied block to.



4. Click Multi-Paste.

The Multi Paste dialog box appears.

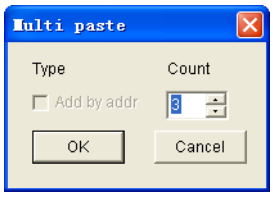


5. In the Multi Paste dialog box:

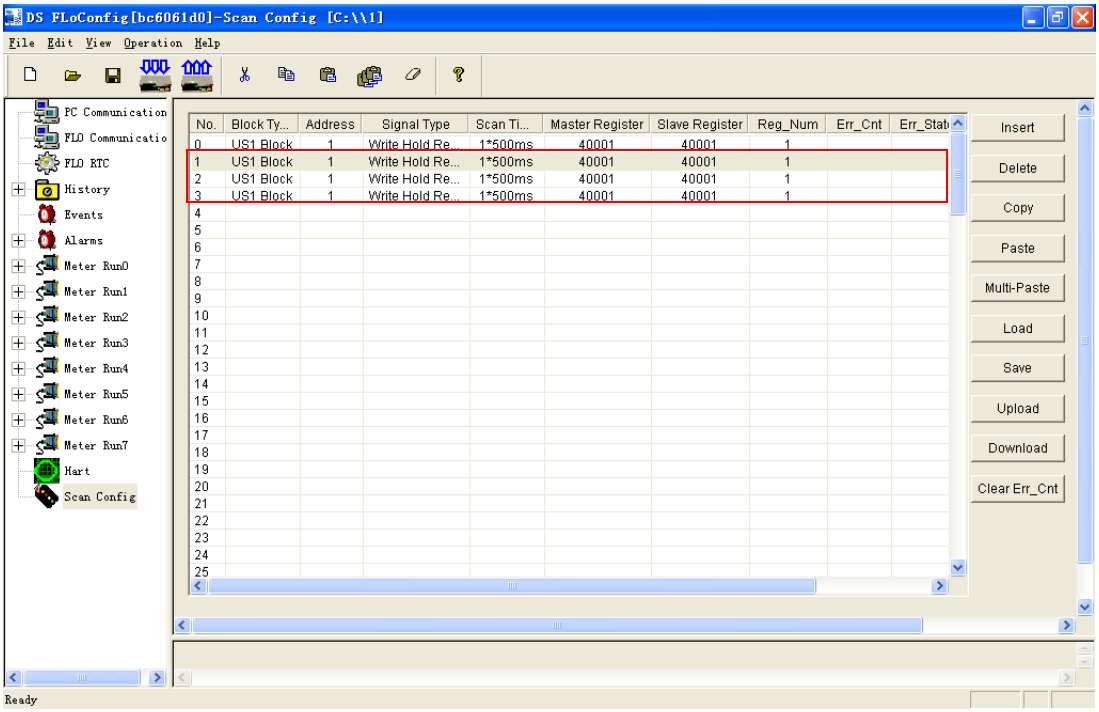
To increment the Master Start_register address of the pasted block by 1, select the check box for Add by addr.

In the Count box, enter the number of blocks you want to paste.

In this example, if the following settings are made:



the result will be this:



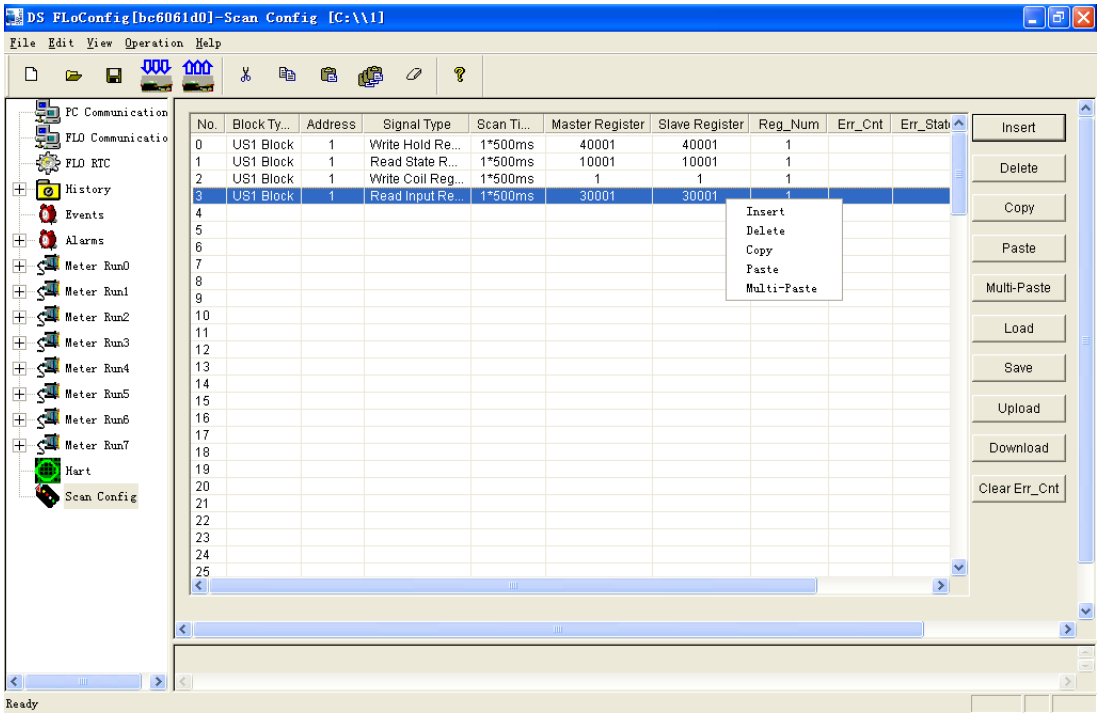
Use the Shortcut Menu

You can also use the shortcut menu for Insert, Delete, Copy and Paste functions. Follow this step to use the shortcut menu.

- Right-click the row you want to apply the function to.

  The shortcut menu appears.

  Here is an example.



Load the Scan Settings

This function enables you to load the scan settings from the file buffer. This allows you to verify the configuration while the DataSite controller is offline.

Follow this step to load previously saved scan settings.

- Click Load.

  The last saved Scan Block Parameter configuration is loaded from the file, Scan Block Parameter.scn and the message, "Load from file successful", appears in the left corner of the status bar.

Save the Scan Settings

This function saves the scan settings into a file buffer on the PC.

Follow this step to save scan settings.

- Click Save.

  The settings are written to the file, Scan Block Parameter.scn and the message, "Save into file successful", appears in the left corner of the status bar.

Upload the Scan Settings from the Controller

Follow this step to upload (read) scan settings from the DataSite controller. The controller needs to be online before you can upload the settings.

- Click Upload.

Download the Scan Settings to the Controller

Follow this step to download (write) scan settings to the DataSite controller. The controller needs to be online before you can download the settings.

- Click Download.

Clear the Error Count

Follow this step to clear the error count in the scan blocks.

- Click Clear Err_Cnt.

Close the Scan Settings Dialog Box

Follow this step to close the Scan Settings dialog box.

- Click Exit.

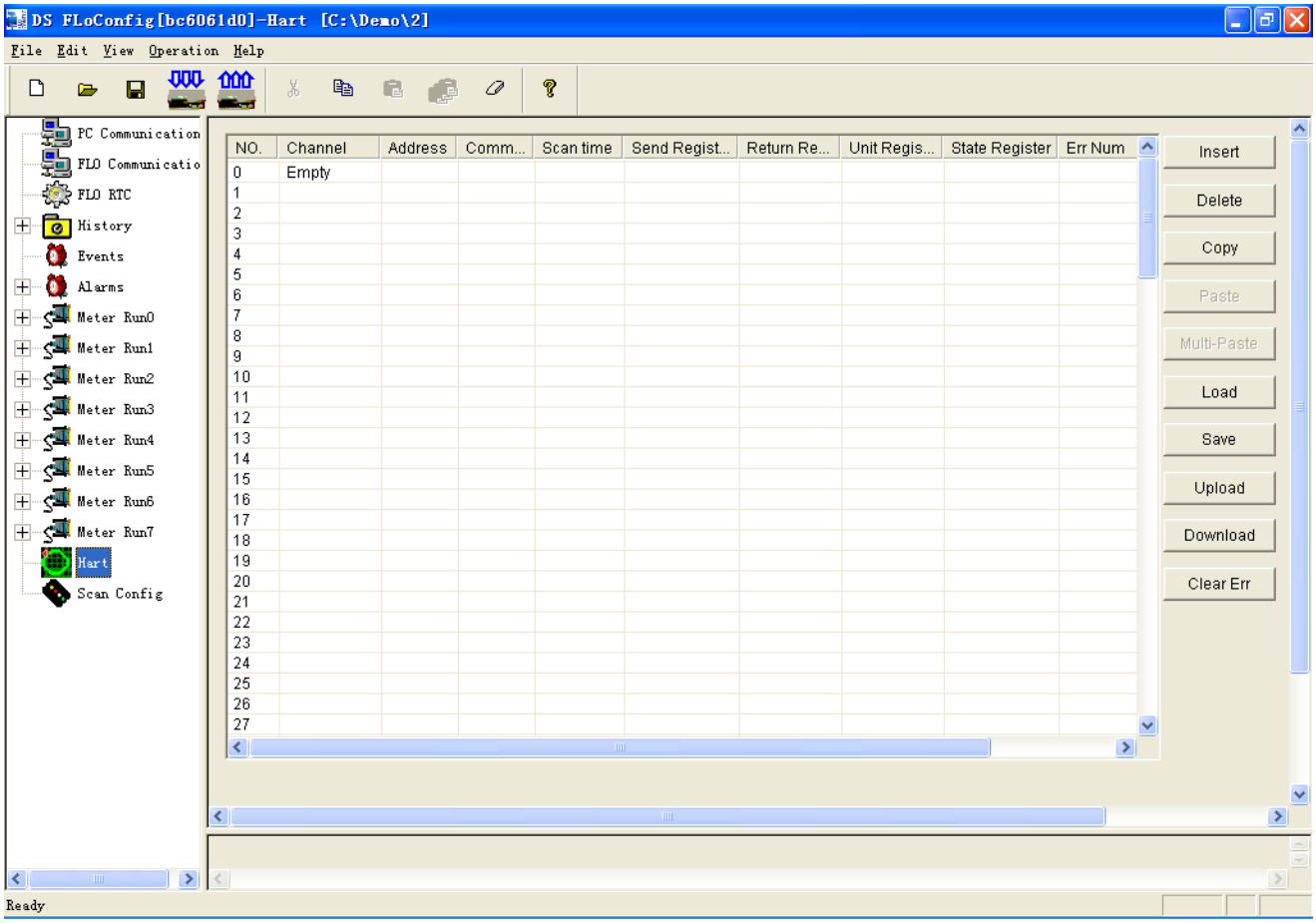
Configure HART Inputs

The HART dialog box lets you configure and send command messages by HART protocol.

Open the HART Dialog Box

Follow this step to open the HART dialog box.

- In the configuration tree, click Hart.



This table provides a description of the column headers in the HART Settings dialog box.

Description of HART block parameters

Header	Description
NO.	Serial number of each HART scan block.
HART Channel	Channel for the HART interface module to send commands to. The effective range is 0…2. • The HART0 channel supports multi-branched HART scan, and the data of up to 13 pieces of HART equipment can be scanned. • The HART1 and HART2 channels are point-to-point scan, and not only do they support HART protocol communication, they also support data collection of 4…20 mA signals.
Address	Communication address of the HART equipment. The effective range is 0…15.
Command	HART command to be sent to the HART equipment. The effective value of each HART command is as follows: • Read Unique Identifier: 0 • Read Primary Variable:1 • Read P. V. Current And Percent Of Range: 2 • Read Dynamic Variable And P. V. Current: 3 • Read Transmitter Variables: 15 • Read Primary Variable Output Information: 33 • Reset Configuration Changed Flag: 38 • Read additional Transmitter Status: 48 • Read Transmitter Variable Information: 54
Scan Time	Time cycle of scanning HART equipment data. Effective range is 50 ms…450 hours.
Send Register	Register for storing command data. Effective range is 40003…49999 for 1758-RTU controllers and 40003…47999 for 1758-FLO controllers.
Return Register	Register for storing command response data. Effective range is 40003…49999 for 1758-RTU controllers and 40003…47999 for 1758-FLO controllers.
Unit Register	Register for storing the unit of HART equipment data returned. Effective range is 40003…49999 for 1758-RTU controllers and 40003…47999 for 1758-FLO controllers.

Description of HART block parameters (Continued)

Header	Description
HART State Addr	Register for storing HART equipment state returned. Effective range is 40003…49999 for 1758-RTU controllers and 40003…47999 for 1758-FLO controllers.
Err_Cnt	Number of times an error occurs. After the HART scan block is configured, if there is no connection with the slave device or if communication fails, this value will be incremented by 1 after each scan cycle. This value is updated whenever you click Upload.
Err_State	Error state of HART scan block configuration. If the Err_State value is 1, it means the communication has failed. A value of 0 indicates that the communication is OK.

IMPORTANT

HART scan data blocks are configured in sequence and each block has a corresponding number. The maximum number of modules is 128.

When one data block is an empty block, all the blocks configured after this empty data block will be invalid.

Here is an example of a HART configuration list:

NO.	HART Channel	Address	Comm...	Scan Ti...	Send Regist...	Return Re...	Unit Regis...	HART State ...
0	0	1	0	34	41101	41121	41141	41161
1	0	1	1	34	41201	41221	41241	41261
2	0	2	0	34	41301	41321	41341	41361
3	0	2	3	35	41401	41421	41441	41461
4	1	0	0	35	41501	41521	41541	41561
5	1	0	3	35	41601	41621	41641	41661
6	2	0	0	35	41701	41721	41741	41761
7	2	0	3	35	41801	41821	41841	41861

Understand HART Commands

Some of the variables read from HART equipment are 32-bit floating-point values. Every floating-point value is stored in two continuous data registers. The higher 16 bits of this value will be stored in the register with a higher address and the lower 16 bits of this value will be stored in the register with a lower address. For example, if a 32-bit double precision IEEE floating point number, such as 1234.5678 is to be stored, two registers, such as register 40108 and register 40109 can be combined to store the number. In hexadecimal, 1234.5678 is 449A 552B. The DataSite controller will store 449A in register 40109 and 522B in register 40108.

Registers Used in HART Commands

The following table lists the number of registers used in each HART command for the four register types, namely Send, Return, Unit and HART state.

Number of registers used in each HART command

Command	Description	Number of registers			
		Send register	Return register	Unit register	HART state register
0	Read Unique Identifier	0	10	0	2
1	Read Primary Variable	0	2	1	2
2	Read P. V. Current And Percent Of Range	0	4	0	2
3	Read Dynamic Variable And P. V. Current	0	10	4	2
15	Read Transmitter Variables	0	10	0	2
33	Read Primary Variable Output Information	4	12	4	2
35	Write Primary Variable Range Values	9	0	0	2
38	Reset Configuration Changed Flag	0	0	0	2
40	Enter/Exit Fixed Primary Variable Current Mode	4	0	0	2
44	Write Primary Variable Units	1	0	0	2
48	Read additional Transmitter Status	0	13	0	2
54	Read Transmitter Variable Information	1	10	2	2
59	Write Number Of Response Preambles	1	0	0	2

If the number of registers is 0 in any command, you do not have to enter a register address.

The register range is 40003…49999 for 1758-RTU controllers, and 40003…47999 for 1758-FLO controllers.

Description of HART Commands

The following table provides a description of each HART command and the registers that it uses.

Description of HART commands

Command	0
Purpose	Read the equipment identifier. This command must be configured for each HART device in order for the other commands to work.
Send register	Not used

Description of HART commands (Continued)

Return register	+0 = manufacturer ID code, 8-bit unsigned integer
	+1 = manufacturer equipment type code, 8-bit unsigned integer
	+2 = forerunner character number, 8-bit unsigned integer
	+3 = global command revision level, 8-bit unsigned integer
	+4 = transmitter revision level, 8-bit unsigned integer
	+5 = software revision level, 8-bit unsigned integer
	+6 = hardware revision level, 8-bit unsigned integer
	+7 = equipment function flags, 8-bit unsigned integer
	+8, 9 = Device Identification Number (double), 24-bit unsigned integer
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**1**
Purpose	Read primary variable (P. V.)
Send register	Not used
Return register	+0, 1 = P. V. (float point)
Unit register	+0 = unit
HART state register	+0 = state 0
	+1 = state 1
Command	**2**
Purpose	Read primary variable current and percentage of span
Send register	Not used
Return register	+0, 1 = P. V. current mA (float point)
	+2, 3 = P. V. percentage (float point) Purpose
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**3**
Purpose	Read dynamic variables and primary variable current
Send register	Not used
Return register	+0, 1 = Primary Variable current (float point)
	+2, 3 = Primary Variable value (float point)
	+4, 5 = Secondary Variable value (float point)
	+6, 7 = Tertiary Variable value (float point)
	+8, 9 = Fourth Variable value (float point)

Description of HART commands (Continued)

Unit register	+0 = Primary Variable unit code, 8-bit unsigned integer
	+1 = Secondary Variable unit code, 8-bit unsigned integer
	+2 = Tertiary Variable unit code, 8-bit unsigned integer
	+3 = Fourth Variable Unit code, 8-bit unsigned integer
HART state register	+0 = state 0
	+1 = state 1
Note	Not all equipment return primary, secondary, tertiary and fourth variables. If the equipment does not support them, zero is written into the value and units unit code for that variable.
Command	**15**
Purpose	Read Transmitter Variables
Send register	Not used
Return register	+0 = alarmselect code
	+1 = transfer function code, 8-bit unsigned integer
	+2 = P. V. range units code, 8-bit unsigned integer
	+3, 4 = upper range value (float point)
	+5, 6 = lower range value (float point)
	+7, 8 = damping value (second) (float point)
	+10 = private-label distributor code, 8-bit unsigned integer
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**33**
Purpose	Read appointed transmitter variables
Send register	+0 = variable 0 code, 8-bit unsigned integer
	+1 = variable 1 code, 8-bit unsigned integer
	+2 = variable 2 code, 8-bit unsigned integer
	+3 = variable 3 code, 8-bit unsigned integer
Return register	+0, 1 = Variable 0 value (float point)
	+2, 3 = Variable 1 value (float point)
	+4, 5 = Variable 2 value (float point)
	+6, 7 = Variable 3 value (float point)
Unit register	+0 = Variable 0 unit code, 8-bit unsigned integer
	+1 = Variable 1 unit code, 8-bit unsigned integer
	+2 = Variable 2 unit code, 8-bit unsigned integer
	+3 = Variable 4 unit code, 8-bit unsigned integer

Description of HART commands (Continued)

HART state register	+0 = state 0
	+1 = state 1
Command	**35**
Purpose	Write Primary Variable Range Values
Send register	+0 = Primary Variable 0 code, 8-bit unsigned integer
	+1, 2 = Primary Variable upper range value (float point)
	+3, 4 = Primary Variable lower range value (float point)
Return register	Not used
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**38**
Purpose	Reset Configuration Changed Flag
Send register	Not used
Return register	Not used
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**40**
Purpose	Enter/Exit Fixed Primary Variable Current Mode
Send register	+0, 1 = Actual fixed Primary Variable current level, units of milliamperes (float point)
Return register	Not used
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**44**
Purpose	Write Primary Variable Units
Send register	+0 = Primary Variable units code, 8-bit unsigned integer
Return register	Not used
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**48**
Purpose	Read Additional Transmitter Status
Send register	Not used

Description of HART commands (Continued)

Return register	+0, 2 = device specific status, 8-bit unsigned integer
	+3 = Operational modes, 8-bit unsigned integer
	+4, 5 = Analog outputs saturated, 24-bit unsigned integer
	+6, 7 = Analog outputs fixed, 24-bit unsigned integer
	+8, 13 = Device-specific status, 8-bit unsigned integer
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1
Command	**54**
Purpose	Read Transmitter Variable Information
Send register	+0 = Code for transmitter variable to be zeroed, 8-bit unsigned integer
Return register	+0 = Return code for transmitter variable to be zeroed, 8-bit unsigned integer
	+1, 2 = Transmit variable sensor serial number, 24-bit unsigned integer
	+3 = Transmit variable limits units code, 8-bit unsigned integer
	+4, 5 = Transmit variable upper limit (float point)
	+6, 7 = Transmit variable lower limit (float point)
	+8, 9 = Transmit variable damping value (seconds) (float point)
	+10, 11 = Transmit variable minumum span (float point)
Unit register	+0 = Transmit variable code, 8-bit unsigned integer
	+1 = Transmit variable limits units code, 8-bit unsigned integer
HART state register	+0 = state 0
	+1 = state 1
Command	**59**
Purpose	Write Number of Responses Preambles
Send register	+0 = Number of preambles to be sent with the Response message from the Slave to the Master, 8-bit unsigned integer, between 5 and 20
Return register	Not used
Unit register	Not used
HART state register	+0 = state 0
	+1 = state 1

Variable and Command

Each piece of HART equipment is designed differently. For example, when you use command 3 to read variables from HART equipment, the four dynamic variables returned may have different meanings, and not all four variables may be valid. Refer to the documentation for the HART equipment for more information. See also the table, Description of HART Commands.

Response Message

The response message of a piece of HART equipment contains the Err Num and Err State values. The Err Num value indicates the number of times communication with the HART equipment has failed. The Err State value indicates whether communication with the HART equipment is a success or failure. An Err State value of 0 means that communication with HART equipment is successful. An Err State value of 1 means that the communication with HART equipment has failed.

Err_Cnt	Err_State
0	0
0	0
0	0
0	0

You can also read the response code from the HART equipment. It is stored as two bytes in the state register which you have configured in the HART scan block. If bit 7 in the first byte is 1, this byte is bit-mapped and all the communication errors are displayed in this byte. If bit 7 in the first byte is 0, this byte is not bit-mapped and the meaning is determined by the value of bit 6 through bit 0.

The following tables list the definition of the first two bytes of the response code according to the HART protocol.

First byte when bit 7 = 1 (Communication Error)

Bit	Value	Description
6	hex C0	Parity error
5	hex A0	Overrun error
4	hex 90	Framing error
3	hex 88	Checksum error
2	hex 84	0 (reserved)
1	hex 82	Rx buffer overflow
0	hex 81	Overflow (undefined)

First byte when bit 7 = 0 (Command Response)

Bit	Description
0(1)	No command-specific error
1(1)	(Undefined)
2(1)	Invalid selection
3(1)	Passed parameter too large
4(1)	Passed parameter too small
5(1)	Too few data bytes received
6(1)	Device-specific command error (rarely used)
7	In write-protect mode
8	This bit can mean any of the following: •Update failure—Returned real-time data has not changed since last read from field device. •Warning: Update failure—Real-time data returned has not changed since last read. •Warning: Set to nearest possible value—Command is accepted but limitations of the field device has caused data sent to be rounded or truncated. •Warning: Update in progress—Results of a command are excluded from its status because the command is still in the process of being completed. •Warning: External input is not set to 4…20 mA temperature. •Warning: Time is corrupt. •Warning: Units and 4/20 points set to new sensor limits.
9	This bit can mean any of the following: •Lower range value too high—Lower range value is greater than the upper sensor limit. •Applied process too high—Process applied to the field device is too high. •Not in proper current mode—Field device is not in fixed current mode, or the current has not been set to the correct value. •Not in proper analog output mode—Field device is not in fixed analog output mode, or the analog output has not been set to the correct value.

First byte when bit 7 = 0 (Command Response) (Continued)

Bit	Description
9 (Continued)	• Invalid module type code—Selected module type code is not valid. • Invalid flange type code—Selected flange type code is not valid. • Frequency set point too high—Value entered for the frequency set point is too high. • Density high limit too high—Value entered for the density high limit is too high. • Selected totalizer cannot be reset—Totalizer selected for display and tertiary variable cannot be reset. • Invalid page—Page requested is not supported. • Invalid level units. • Filter auto-adjust error. • Maximum zeroing time is too large. • DI too high—Value of the first density data is too high. • Not in reference or sample mode. • Invalid date. • Invalid alarm relay HOLD default code. • Frequency too high.
10	This bit can mean any of the following: • Lower range value too low—Lower range value is less than the lower sensor limit. • Applied process too low—Process applied to the field device is too low. • Multidrop not supported—Field device does not support multidrop. • Invalid range code—Range code selected is not valid. • Calibration location not set to user—Before this command can be accepted, the calibration location must be set to User. • Invalid configuration for special calibration—Configuration is not set properly for special calibration. • Invalid liner material code—Liner material code selected is not valid. • Frequency set point too low—Value entered for the frequency set point is too low. • Density high limit too low—Value entered for the density high limit is too low. • Invalid address—Address for this field device is not valid. • Trim location not set to user—Before this command can be accepted, trim location must be set to User. • Invalid body type code. • Invalid volume units. • Invalid density units. • Maximum zeroing time is too small. • DI too low—Value of the first density data is too low. • Instrument in reference mode. • Invalid analog output type code. • Invalid automatic temperature compensation code. • Invalid alarm relay configuration code. • Frequency too low. • Invalid low/high millivolt code

First byte when bit 7 = 0 (Command Response) (Continued)

Bit	Description
11	This bit can mean any of the following: • Upper range value too high—Upper range value is greater than the upper sensor limit. • Excess correction attempted—Correction attempted is outside of the permissible limits of the field device. • In multidrop mode—When in multidrop mode, this command cannot be performed. The analog output is deactivated and cannot be used when the polling address is set to a value within the range of 1…15. • Invalid sensor type code—Sensor type code selected is not valid. • Invalid sensor material code—Sensor material code selected is not valid. • Invalid base volume units code—Base volume units code selected is not valid. • Invalid base flow units code—Base flow units code selected is not valid. • Flow rate set point too high—Value entered for the flow rate set point is too high. • Density low limit too high—Value entered for the density low limit is too high. • Access denied—Access to this part of the memory is not allowed. • Invalid transmitter variable code. • Invalid item number. • Invalid wetted material code. • Standard deviation too large. • D2 too high—Value of the second density data is too high. • Instrument in sample mode. • Invalid calibration point. • Flow rate factor too high. • Invalid analog output HOLD code.
12	This bit can mean any of the following: • Upper range value too low—Upper range value is less than the lower sensor limit. • Invalid characterization—Characterization of the sensor is not valid. • Invalid number of wires—Number of wires on the sensor is not valid. • Invalid calibration point units code—Units code sent with the calibration point is not valid. • Invalid calibration location code—Calibration location code selected is not valid. • Invalid base time units code—Base time units code selected is not valid. • Flow rate set point too low—Value entered for the flow rate set point is too low. • Incorrect format—Format of the parameter entered is not correct. • Density low limit too low—Value entered for the density low limit is too low. • Write to ROM attempted—Writing of data to read-only memory is attempted. • Invalid units code. • Invalid sensor connection code. • Invalid trim points units code—Units code sent with the trim point is not valid. • Invalid trim location code—Trim location code selected is not valid. • Invalid base mass time units. • Invalid base volume time units. • Standard deviation too small. • Standard factor format.

First byte when bit 7 = 0 (Command Response) (Continued)

Bit	Description
12 (Continued)	• D2 too low—Value of the second density data is too low. • Invalid command number. • Invalid density units and calibration point. • Flow rate factor too low.
13	This bit can mean any of the following: • Upper and lower range values out of limits—Upper and lower range values are outside of their limits. • Range and sensor type not entered—Before characterization, range and sensor type need to be entered. • Invalid number of bytes—The Number of Bytes parameter received in this command is not valid. • Invalid meter option—Meter option selected is not valid. • Special sensor not available—Calibration for special sensor is not available. • Invalid transfer function code. • Invalid strapping point number. • Invalid base mass flow units. • Invalid base volume flow units. • Invalid trim point number. • Invalid cutoff type code. • Invalid security code. • Invalid alarm relay delay time code.
15	This bit can mean any of the following: • Invalid analog output number code. • Invalid level value. • Invalid alarm relay number code. • Invalid buffer number code.
16	Access restricted
28	Invalid range units code.
32	Device is busy
64	Command not implemented

(1) Bits 6…0 are decoded as an integer, and not bit-mapped.

Second byte - when unused

Bit	Description
7	All bits 0 (when a communication error is reported in the first byte).
6	
5	
4	
3	
2	
1	
0	

Second byte - Field Device Status

Bit	Value	Description
7	hex 80	Field device malfunction
6	hex 40	Configuration changed
5	hex 20	Cold start
4	hex 10	More status available
3	hex 08	Analog output current fixed
2	hex 04	Analog output saturated
1	hex 02	Nonprimary variable out of limits
0	hex 01	Primary variable out of limits

Insert a HART Scan Block

Follow these steps to insert a HART scan block.

1. In the HART Settings dialog box, select the row where you want to insert the scan block to and click Insert. Alternatively, you can double-click the row.
   Note that you cannot insert data after an empty data block.

   An Invalid scan block is inserted.

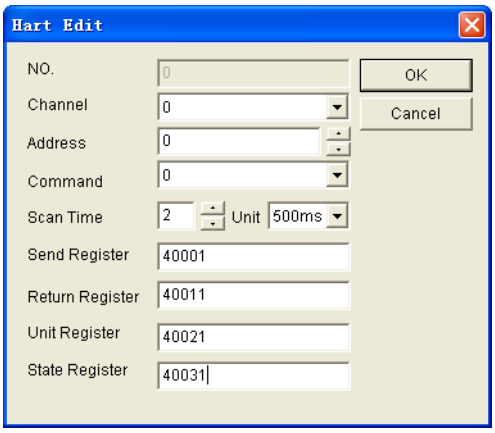
2. Double-click the block to edit.

Edit a HART Scan Block

Follow these steps to edit a HART scan block.

1. Double-click the block you want to edit.

   The Edit dialog box appears.



2. From the Channel pull-down menu, choose a channel for the HART interface module to send commands to. The effective range is 0…2.
   - The HART0 channel supports multi-branched HART scan, and the data of up to 13 pieces of HART equipment can be scanned.
   - The HART1 and HART2 channels are point-to-point scan, and not only do they support HART protocol communication, they also support data collection of 4…20 mA.

3. In the Address box, specify the communication address of the HART equipment. The effective range is 0…15.

4. From the Command Num pull-down menu, choose the HART commands to be sent to the HART equipment. This table shows the effective value of each HART command. .

Effective values of HART commands

Effective Value	HART Commands	Effective Value
0	Read Unique Identifier	
1	Read Primary Variable	
2	Read P. V. Current And Percent Of Range	
3	Read Dynamic Variable And P. V. Current	
15	Read Transmitter Variables	
33	Read Primary Variable Output Information	
35	Write Primary Variable Range Values	Only Use in HART TRIG block

Effective values of HART commands (Continued)

Effective Value	HART Commands	Effective Value
38	Reset Configuration Changed Flag	
40	Enter/Exit Fixed Primary Variable Current Mode	Only Use in HART TRIG block
44	Write Primary Variable Units	Only Use in HART TRIG block
48	Read additional Transmitter Status	
54	Read Transmitter Variable Information	
59	Write Number Of Response Preambles	Only Use in HART TRIG block

IMPORTANT Command 0 must be configured for each HART device in order for the other commands to work.

5. In the Scan Time box, enter the number of units and select the time unit to specify the time cycle of scanning HART equipment data.
   For example, if you enter "1" for the number of units, and select "500 ms" for the time unit, the scan time will be 1 x 500 ms = 500 ms. This means that the current HART scan block will be executed every 500 ms.

6. In the Send Register box, define the register for storing command data.

7. In the Return Register box, define the register for storing command response data.

8. In the Unit Register box, define the register for storing the unit of HART equipment data returned.

9. In the State Register box, define the register for storing the HART equipment state returned.

TIP The register range is 40003…49999 for 1758-RTU controllers, and 40003…47999 for 1758-FLO controllers.

See Description of HART Commands on page 213 for more information on the Send, Return, Unit, and HART State Addr registers.

10. Click OK.

    The HART Edit dialog box is closed and the settings are saved to the new block.

Delete a HART Scan Block

Follow these steps to delete a HART scan block.

1. Select the block you want to delete.
2. Click Delete.

   A dialog box prompting you to confirm the deletion appears.
3. To confirm the deletion, click OK.
   To cancel the deletion, click Cancel.

Copy a HART Scan Block

Follow these steps to copy a HART scan block.

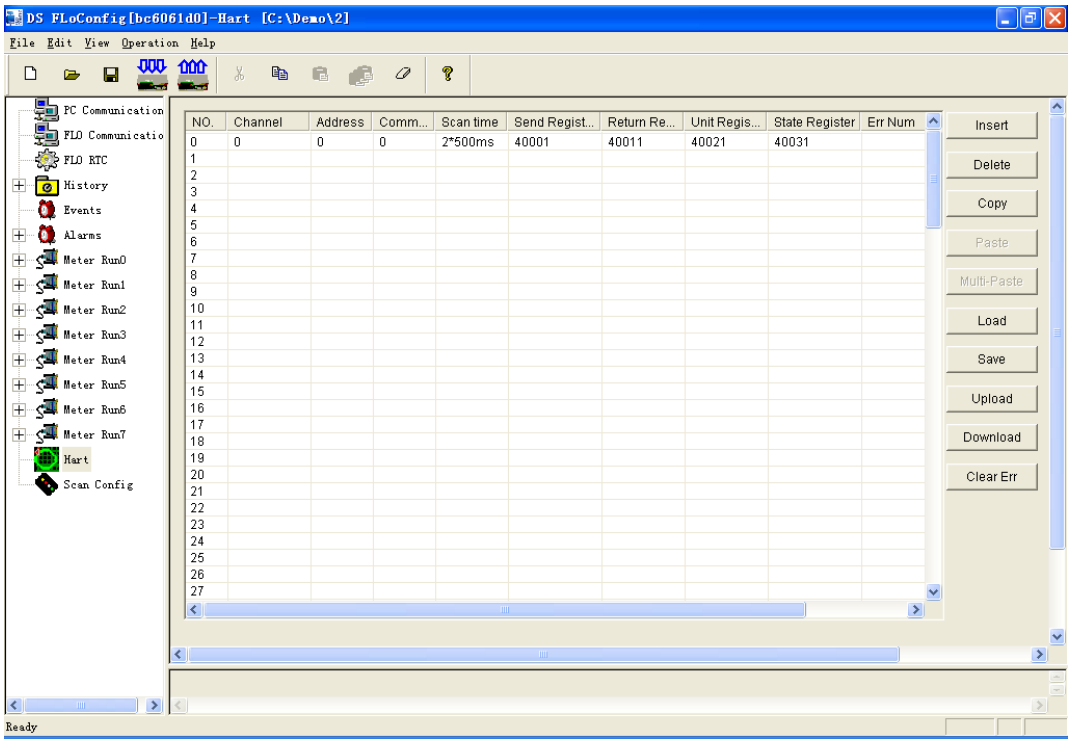
1. Select the block you want to copy.
2. Click Copy.

Paste a HART Scan Block

Follow these steps to paste a HART scan block.

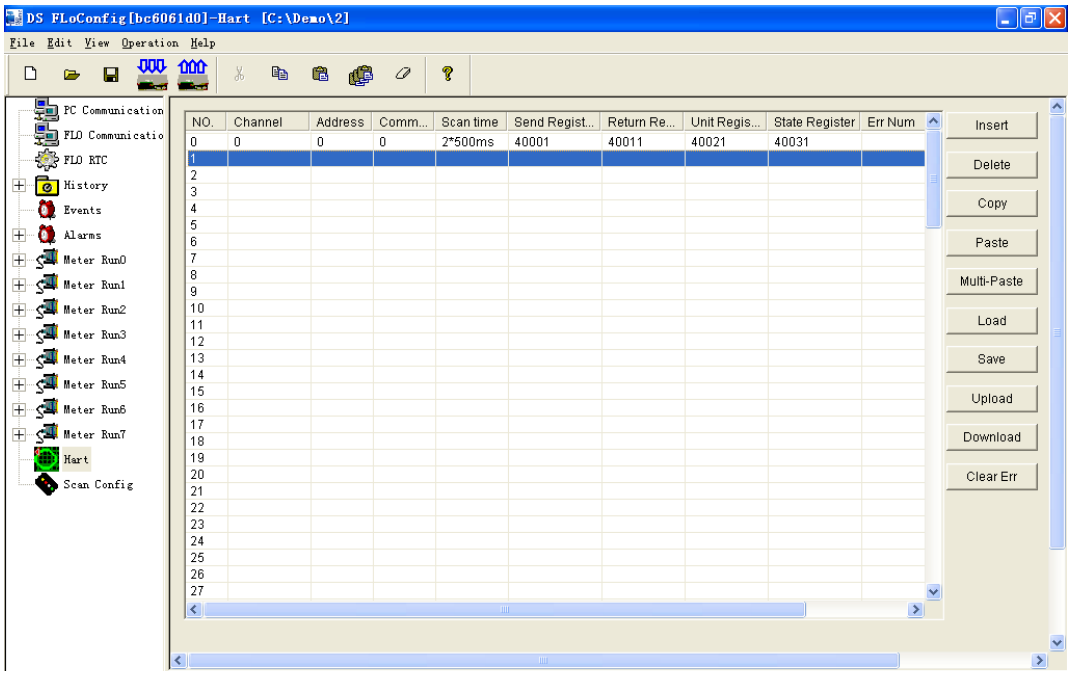
1. Select the block you want to copy and paste.

2. Click Copy to copy the block.

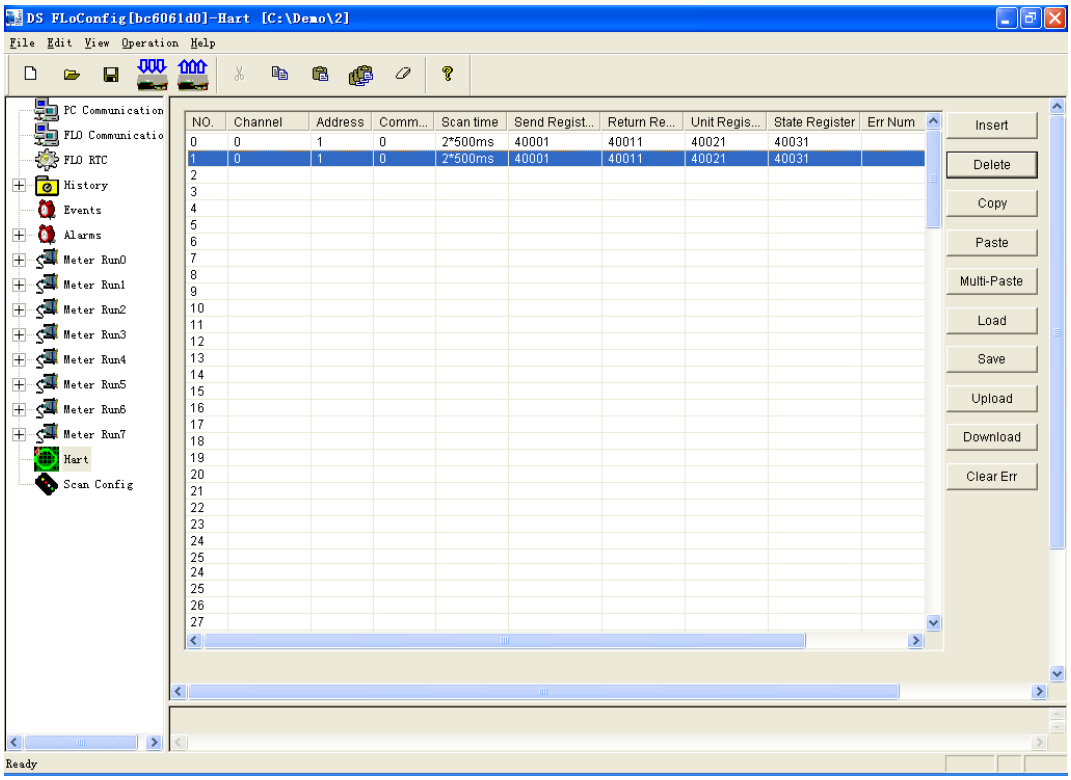


3. Select the row you want to paste the copied block to.

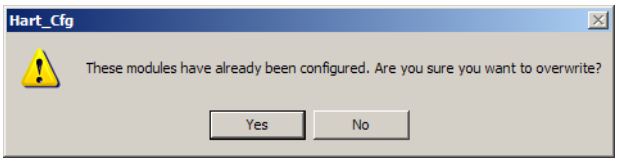
TIP You can only select an empty row that is right after the selected block, or a row that already contains a block.



4. Click Paste to paste the copied block.



If you are pasting over a row that already contains a block, the following dialog box appears.



Click Yes to overwrite the block, or No to cancel the pasting.

Paste a HART Scan Block to Multiple Rows

Use the Multi_Paste function to paste a HART scan block to multiple rows. This function works in the same way as the Multi_Paste function in the Scan Settings dialog box. For details, see Paste a Scan Block to Multiple Rows on page 45.

Use the Shortcut Menu

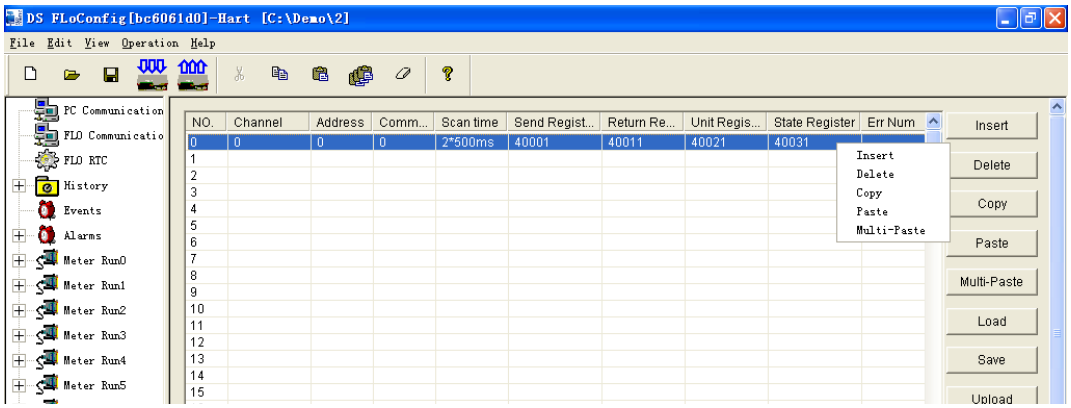
You can also use the shortcut menu for Insert, Delete, Copy and Paste functions.

Follow this step to use the shortcut menu.

- Right-click the row you want to apply the function to.

  The shortcut menu appears.

  Here is an example.



Load the HART Settings

This function enables you to load the HART settings previously saved in a file buffer on the PC. This allows you to verify the settings while the DataSite controller is offline.

Follow this step to load HART settings from the file.

- Click Load.

  If the settings are loaded successfully, the status bar will display the message, "Load from file successful".

Save HART Settings

Follow this step to save the HART settings into a file buffer on the PC.

- Click Save.

  If the settings are saved successfully, the message, "Save successfully" will be displayed in the status bar. The settings are saved to the file, hart.hrt, by default.

Upload the HART Settings from the Controller

Follow this step to upload (read) HART Settings from the DataSite controller. The controller needs to be online before you can upload the settings.

- Click Upload.

Download the HART Settings to the Controller

Follow this step to download (write) HART Settings to the DataSite controller. The controller needs to be online before you can download the settings.

- Click Download.

Clear the Error Count

Follow this step to clear the error count in HART scan data block of controller.

- Click Clear Err.

DataSite DNP3 Configuration Utility (DS DNP3)

This chapter provides information on the DataSite DNP3 Configuration utility, DS DNP3. This tool can be used to configure the 1758-RTU and the 1758-FLO DataSite controllers.

Introduction

Distributed Network Protocol (DNP3) is a standard communication protocol based on electricity, oil, natural gas, water, sewage treatment and other industrial control systems. It is an open communication protocol which is flexible and widely used. DNP3 is in line with the open protocol standards used in various types of networks.

DNP3 Features

These are the features of DNP3.

- Object-oriented communication

  DNP3 describes and processes data in the object-oriented way, thus reflecting the dynamic characteristics in changing incidents.

- Multiple data types

  The request and response messages can contain a variety of data types (data objects).

- Multi-master station

  A slave station can communicate data with multiple master stations.

- Unsolicited upload

  The slave station can send unsolicited information to the master station. This is called an exception report. Functions such as self-reporting on changes, incident order recording and accident recall are available.

- Data priority classification

  Data objects can be classified according to priority. Requests can be issued based on priority.

- Multi-connected equipment address

  A communication network can have up to 4 master stations, with each station being connected to up to 65,000 pieces of equipment, each with a unique address. The actual configuration for each network depends on the application.

- Time synchronization

  Time-correcting commands are provided. With this, the slave station can be corrected by the master station or initiate a time-correcting command itself.

- Time label

  Event information can have time labels.

- Broadcasting information

  A site can send broadcasting information to other sites in the network.

- Data validation

  The data link layer and the application layer can confirm communication information.

DNP3 Protocol Structure

DNP3 is a layered protocol based on OSI-7 layer protocols.

It supports the following layers:

- Application layer

  The application layer sends request information from the master station to the slave station, or unrequested response information from the slave station to the master station. Information in this layer can be confirmed and re-issued.

- Transport layer

  The transport layer divides big application layer packets into several small information packets in order to facilitate transmission by the data link layer.

- Data link layer

  The data link layer sends messages to the physical layer or receives information from it. To ensure the accuracy of data transmission, every 16 words of information in the data link layer is a data block with an additional two-byte cyclic redundancy check (CRC) code. Information in this layer can be confirmed and re-issued.

- Physical layer

  The physical layer describes the physical media for DNP communication, such as a serial port or Ethernet.

DNP3 Data Object Library

DNP3 protocol contains data points with a variety of data types. Data points are grouped according to their data types, and the groups are called data objects. Examples of data objects are, binary input object, binary output object, analog input object, counter object, freeze counter object, string object, and analog output object. The collection of these data object groups is referred to as the data object library.

DNP3 data objects can be further defined through object variants, such as the 16-bit analog input, 32-bit floating-point analog input, and binary input, all of which contain time.

DNP3 Class Objects

Under normal circumstances, each data type can be divided into static objects and event objects. A static object contains the current value of objects, and an event object is brought about by the results of data changes.

In DNP3, there are four kinds of class objects:

- Class 0
- Class 1
- Class 2
- Class 3

A Class 0 object contains all of the static data. Class 1, 2, and 3 objects are event objects. This classification provides a method to define data priority. Class 1 is the highest priority, and class 3 is the lowest.

The allocation of class objects can increase the efficiency of communication between the master station and the slave station. For example, the master station can scan high-priority data more frequently, and the slave station only returns the changes in event data. The master station can obtain all the static data without priority allocation from the slave station through the scan of class 0 data.

DNP3 allows the slave station to send the change information of the event object proactively to several master stations (send unrequested response information or exception report). The information is transmitted according to class objects, such as the data which can be set to transmit the data of the highest priority class 1 only.

DNP3 Internal Indication (IIN) Sign

The Internal indication (IIN) sign object is an important data object in DNP3. The IIN sign is set by the slave station to indicate its internal state and diagnostic results such as the appearance of class event, equipment error, equipment startup and equipment reset.

SDNP3

SDNP3 is a simplified protocol based on DNP3.

The maximum number of data points that can be configured is 400. The maximum size of each session that can be configured is 200 data points. Class 0 is static data without event characteristics. Classes 1, 2, and 3 contain event characteristics. In each session, the buffer for AI, DI, PI, Freeze PI events can be set to a maximum length of 2000 data points, and String event buffers can be set to a maximum of 10 data points.

When the event log exceeds the set value, the oldest record will be overwritten with the newest record. For example, if the AI value threshold is set as 100, when the AI value exceeds 100, the event will be recorded into one data point.

Since only inputs have active reporting, only input objects have event buffer. For example, AI, DI, PI, Freeze PI and String. Output objects, such as AO and DO, have no event buffer.

Every data point has a corresponding data type. For example, the data type for DO and DI is Bool. AI and DO have three data types, namely 16-bit, 32-bit, and Float. PI has two data types, namely 16-bit and 32-bit. String has four data types, namely String(20), String(60), String(100), and String(250).

The range of values for each data type is listed in the following table.

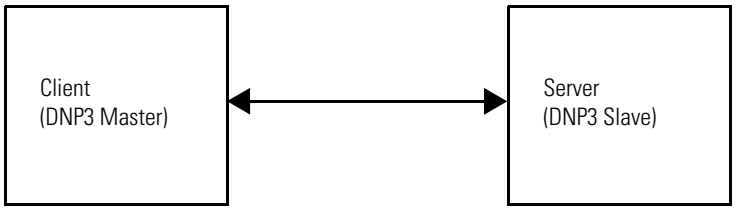
Data types and value ranges

Data Type	Range of Values
Bool	0 or 1
16-bit	0…65535
32-bit	-2147483648…2147483647
Float	-3.4*10^38…3.4*10^38
String(20)	20 bytes
String(60)	60 bytes
String(100)	100 bytes
String(250)	250 bytes

SDNP3 Network Structure

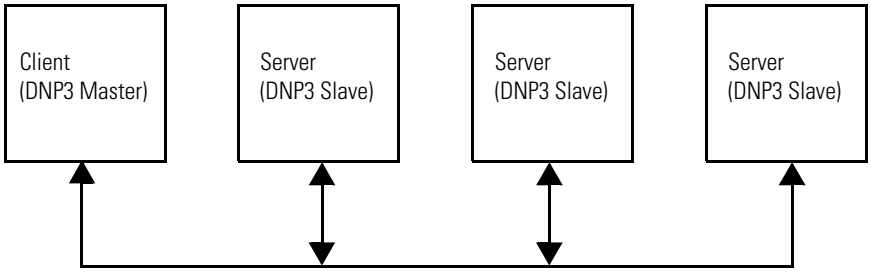
When using the SDNP3 communication protocol with the support of different communication channels, different communication structures can be set up, such as point-to-point, point-to-multipoint, multipoint-to-multipoint.

Point-to-point communication structure



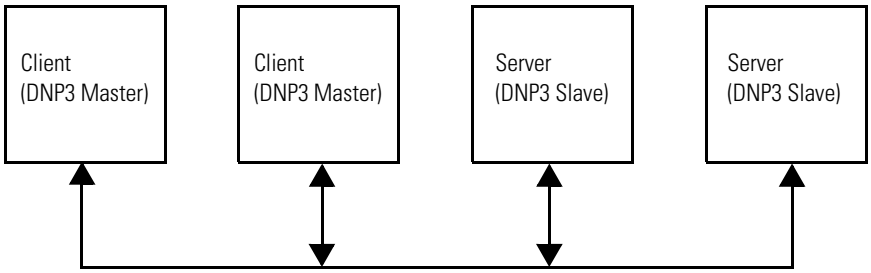
Point-to-point communication can be achieved in communication channels such as RS232, RS485, Ethernet, and wireless radio stations.

Point-to-multipoint communication structure



Point-to-multipoint communication can be realized when using RS485 and Ethernet as communication channels. If the slave station is allowed to upload data without being commanded by the master station to do so, the RS485 communication modes will be in conflict.

Multipoint-to-multipoint communication structure



This communication structure is supported when using the DataSite controller on the Ethernet network.

SDNP3 Data Scan Mode

According to the requirements for communication structures, channel types and master station to different data points, the following types of data scan mode can be selected.

- Self-reporting on changes

  The master station will not communicate with the equipment of the slave station proactively. The equipment of the slave station reports the event data to the master station proactively.

- Self-reporting on changes plus polling

  The master station will scan all or part of the static data from the equipment of the slave station, and at the same time, the equipment of the slave station will report the event data to the master station proactively.

- Self-reporting on changes under polling

  The master station will scan all or part of the static data from equipment of slave station, and scan event data at periodic intervals, such as slow scanning of static data, quick scanning of event data.

- Polling

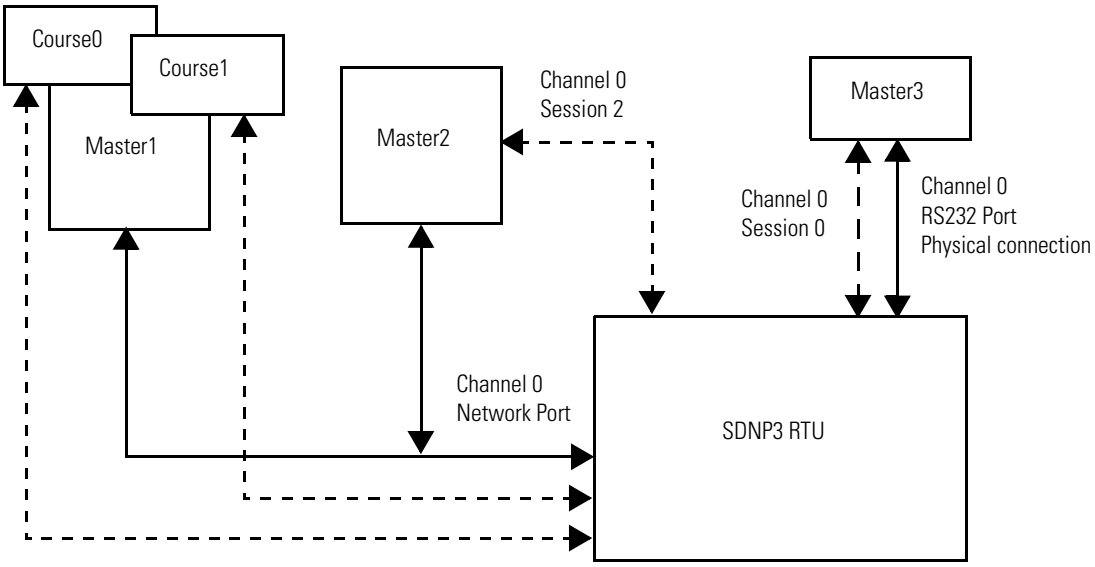
  The master station only scans all or part of the static data.

SDNP3 Channel and Session

An SDNP3 channel is the physical SDNP3 communication connection, such as a network port or a serial port.

An SDNP3 session is the logical communication links established between a master station and a slave station of SDNP3.

SDNP3 Channels and Sessions



Each channel can establish multiple session links. Each session has an independent master station number. The session master station numbers among different channels can be the same.

SDNP3 has a physical channel. The largest session number of each channel is four.

SDNP3 Data Objects

This table lists the types of SDNP3 data objects and their descriptions.

SDNP3 Data Objects and Their Descriptions

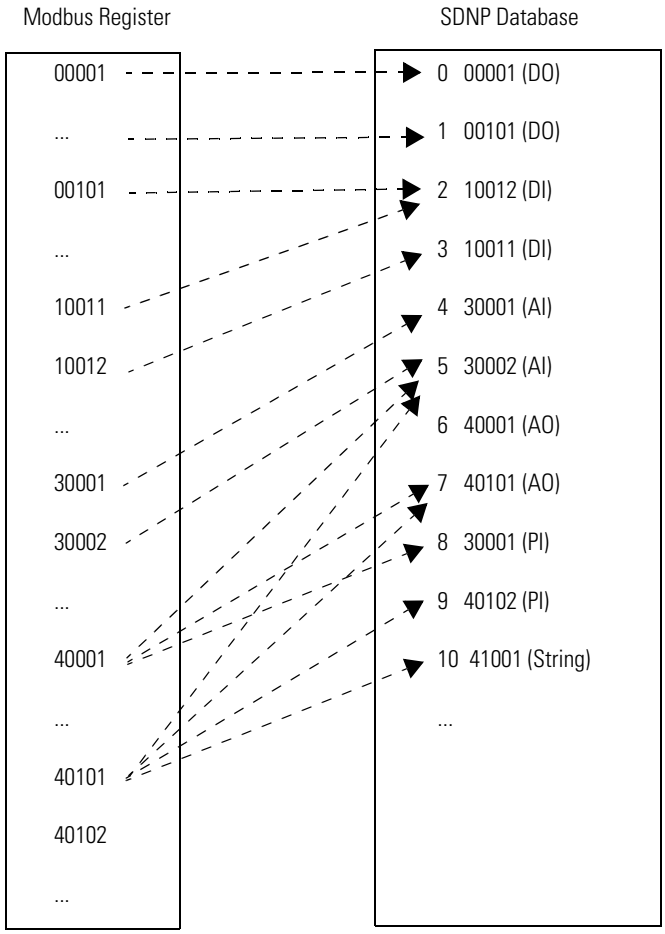
SDNP3 Data Object	Object Number	Description
Binary input object	1	Current status of the binary input, digital input (DI) data
Binary input change object	2	Binary input changes and new values, DI data
Binary output object	10	Current value of the binary output, digital output (DO) data
Binary counter object	20	Current data of counter input, counter input (PI) data
Binary freeze counter object	21	Current data of freeze counter input, freeze counter input (Freeze PI) data
Binary counter change object	22	Counter input changes and new values (PI) data
Binary freeze counter change object	23	Freeze counter input changes and new values (Freeze PI) data
Analog input object	30	Current data of analog input, analog input (AI) data
Analog input change object	32	Analog input changes and new values, AI data
Analog output object	40	Current value of the analog output, analog output (AO) data
Time and date object	50	Current time of the DataSite controller
Class object	60	Event class 0, 1, 2, 3
Internal indication (IIN) sign object	80	Indicates current communication, data, and operation status of the DataSite controller
String object	110	String object data
String change object	111	String changes and new values

SDNP3 Data Points and Database

Choose SDNP3 data points from the Modbus register. Each SDNP data point matches a Modbus register. Each data point has a set of corresponding configuration parameters, such as number of data points, Modbus address, data types, event class and so on. Data points can match actual RTU I/O, and also match intermediate variable registers. Different data points can match the same Modbus register.

The collection of SDNP3 data forms the SDNP3 database. The maximum number of data points of the database is 400.

SDNP3 Data Points



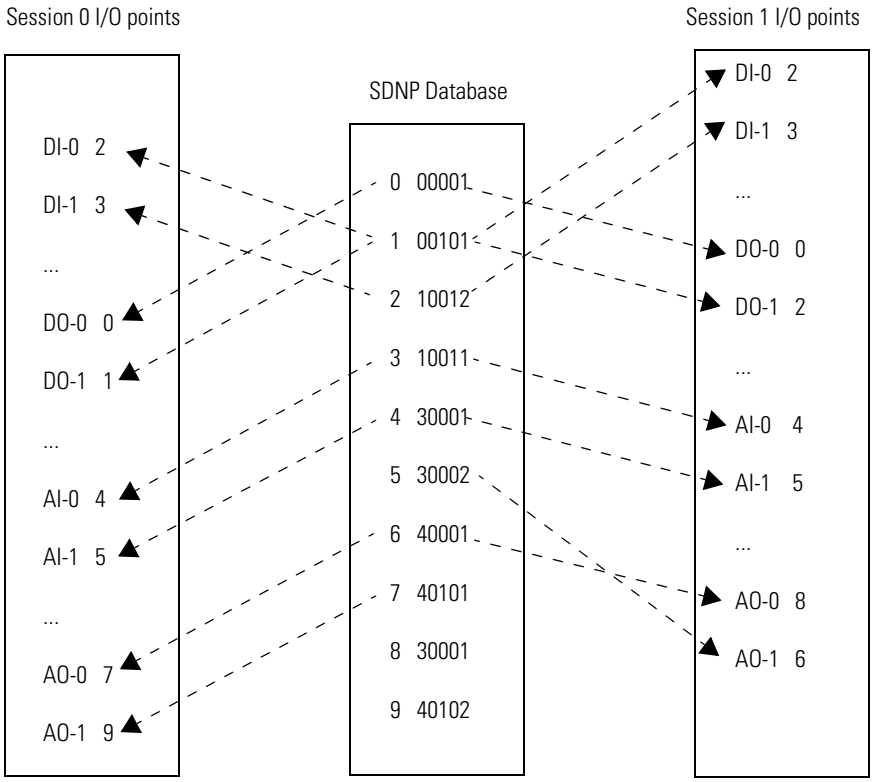
Modbus register addresses can match any type of DNP3 data points. For example, any address of Modbus 3 or 4 data segments can be mapped to the AI points and AO points of DNP3.

SDNP3 Session I/O Points

Each SDNP session has a group of session IO points (data objects), including the following types: binary input points (DI), binary output points (DO), analog input points (AI), analog output point (AO).

Session IO points are selected from SDNP3 database, you can choose the same data points for different session, and also choose data points. The maximum number of data points for each session IO is 200.

SDNP3 Session I/O Points

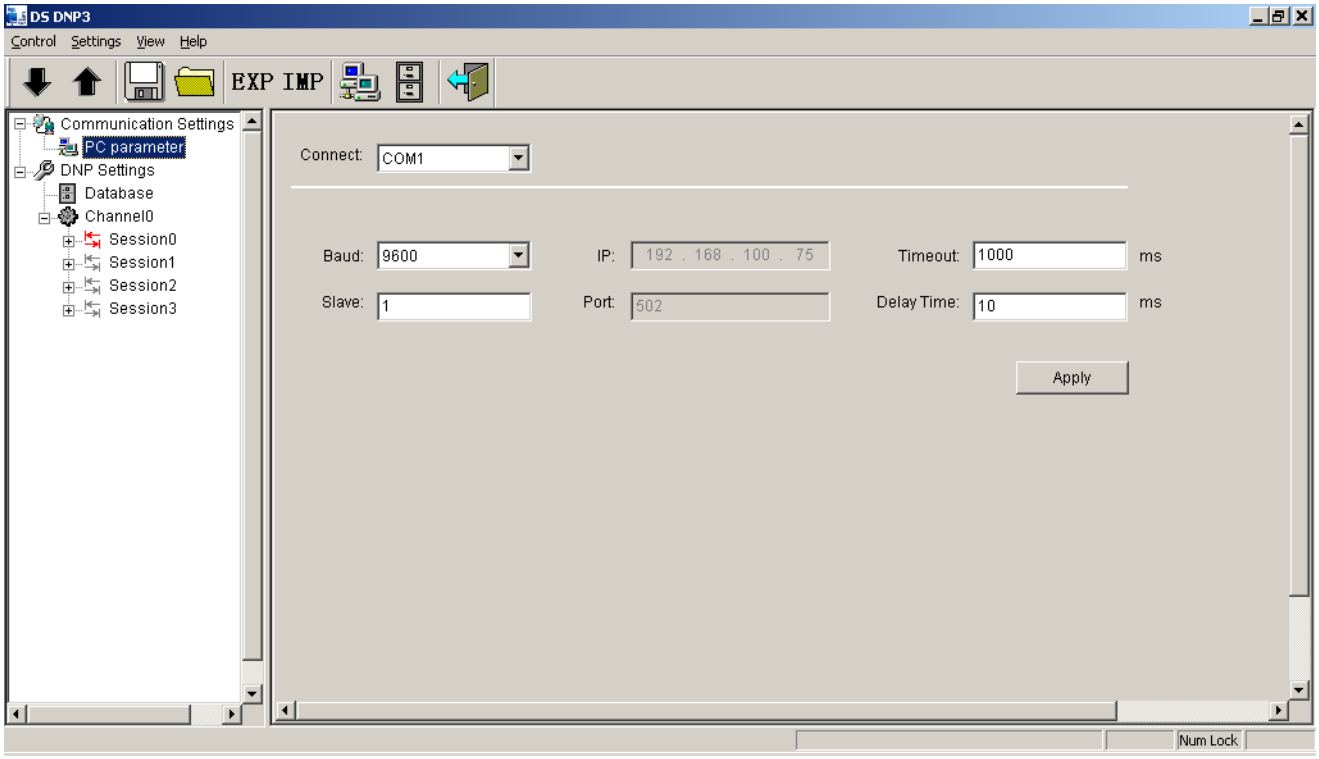


Start DS DNP3

Follow this step to start DS DNP3.

- Click Start > Programs > Rockwell Software > DataSite Products > DataSite Tools > DS DNP3.

The **DS DNP3** window appears.



Configure PC Communication Settings

PC communication parameter setting can be used to enable the writing of data from the host computer to the DataSite controller while the host computer can upload data from the DataSite controller according to the configuration at the same time.

ATTENTION



Make sure that the PC communication parameters are set correctly. Otherwise, communication between the PC and the DataSite controller will not work.

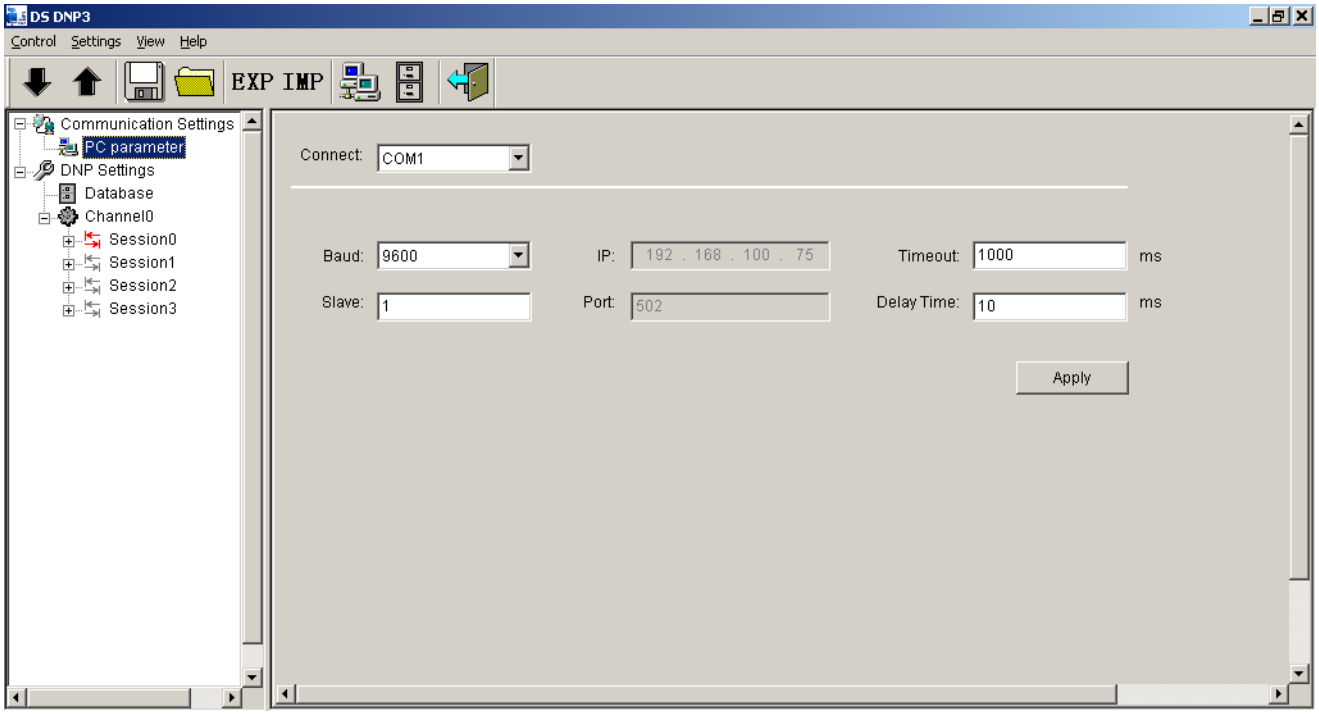
Configure the PC Communication

1. In the configuration tree of the DS DNP3 window, click the "+" symbol next to Communication Settings.

   The Communication Settings tree is opened.

2. Click PC Parameter.

   The parameters for PC communications appear.

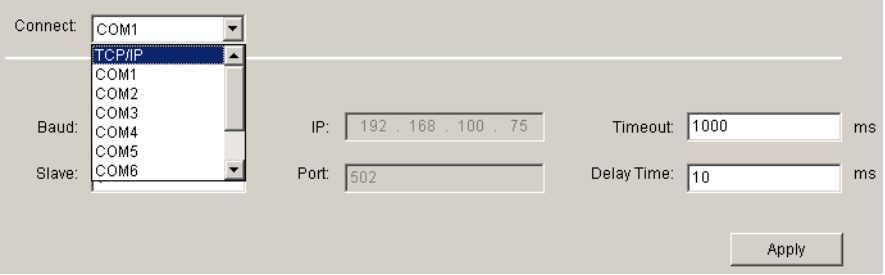


The following table lists the range and default value of each PC communication parameter.

Value ranges of PC communication parameter

Variable	Range	Default Value
Connect	TCP/IP, COM1…COM9	TCP/IP
Baud	2400, 4800, 9600, 38400, 57600	9600
Slave	1…247	1
IP	xxx.xxx.xxx.xxx	192.168.100.75
Port	5…65535	502
Delay Time	10…1000	10
Timeout	1000…10000	1000

3. From the Connect pull-down menu, select a TCP/IP or a serial (COM) port.



If you have selected TCP/IP, skip to step 6 to configure TCP/IP port settings.

If you have selected a COM port, continue to configure COM port settings.

4. Determine the parameters for the serial port of the DataSite controller currently in use. From the Baud pull-down menu, select the baud rate for the COM port.

5. In the Slave box, enter the slave station number.

6. Enter the IP address and communication port number.

7. In the Delay Time box, enter the duration, in milliseconds, for the delay time. Maximum delay time allowed is 1 s (or 1000 ms).

8. In the Timeout box, enter the duration, in milliseconds, for the timeout. Maximum timeout allowed is 10 s (or 10000 ms).

9. Click Apply.

The new settings will take effect.

After downloading the DNP3 data, the DataSite controller will power off and on again automatically. Wait for this power cycle to be completed before resuming operation.

IMPORTANT If NET0 or COM is configured as the communication interface for DNP3, then they cannot be used by DS FloConfig, DS Settings or Modbus Scan to communicate with the DataSite controller.

Configure DS DNP3

Use this function to configure DNP3 data points for the DataSite controller.

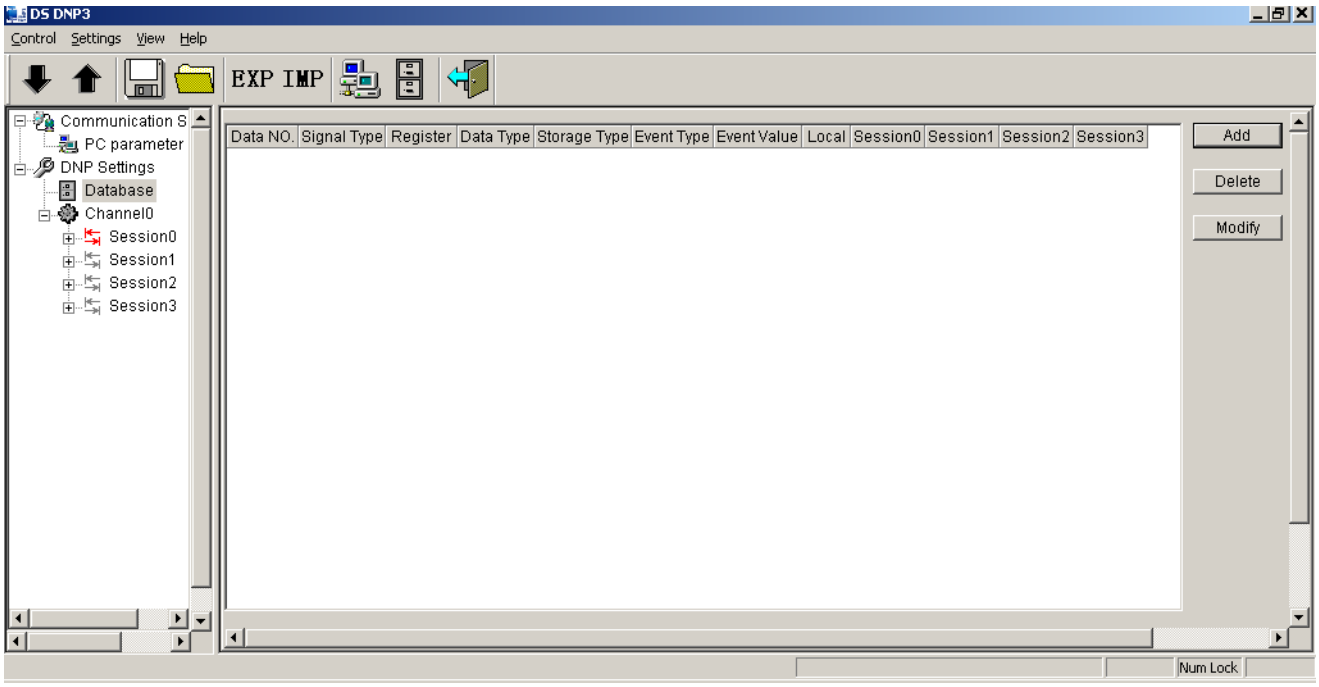
Configure the DS DNP3 Database

Follow these steps to open the database.

1. From the Settings menu in the DS DNP3 window, choose Database.

   Alternatively, you can also click the Database icon in the toolbar.

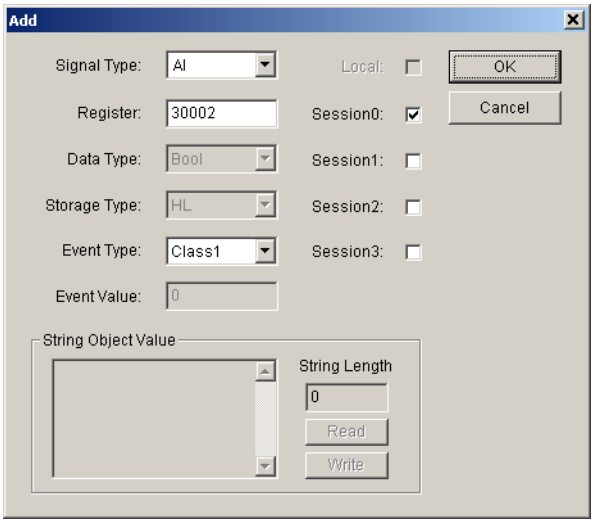




2. Click the Add button.

Each data point is added automatically to the corresponding register address. The number of data points is an incremental change which starts at 0.

The register addresses correspond to the acquisition signal. For example, if you click Add, select AI in the Add dialog box that appears, and click OK, an AI data point is added.



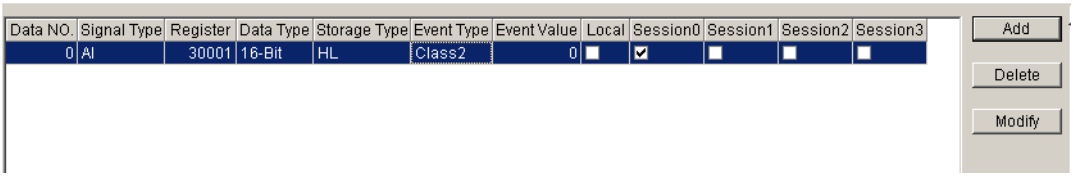
The following table lists the register address ranges of AI, AO, DI, DO, PI, and String for the 1758-RTU controllers.

Register address ranges for AI, DO, DI and DO

Signal Type	Register Address Range
AI	30001…34096 or 40001…49999
AO	40001…49999
DI	10001…14096 or 1…4096
DO	1…4096
PI	30001…34096 or 40001…49999
String	40003…49999

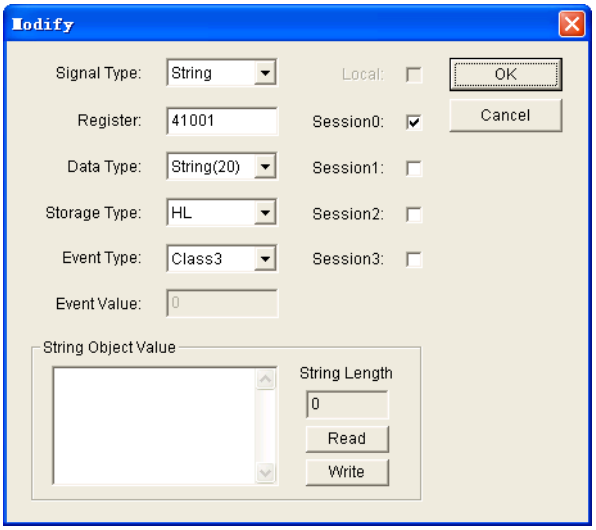
To view the address ranges for the 1758-FLO controllers, see Chapter 4 Extension Modbus Protocol for DataSite Controllers (1758-FLO).

3. To edit the values in the Register, Event Val or Description fields, click Modify and enter the new values. For example, if you want to change the register address for a data point, click Modify and enter the new value in the Modify dialog box that appears.



4. Click Modify to modify the signal type, data type, storage type and event type for a record.

   You can select a different option for each attribute from its pull-down menu in the Modify dialog box.

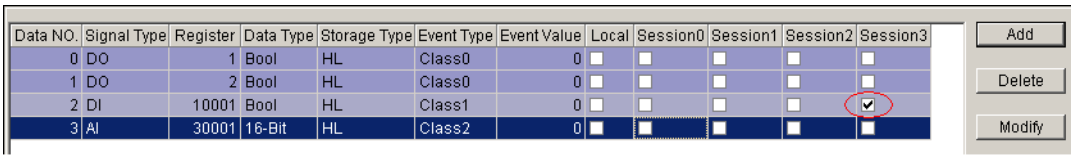


The following table provides a description of the options for these attributes.

Options for Signal Type, Data Type, Storage Type and Event Type

Attribute	Option
Signal Type	AI, AO, DI, DO, PI, and String. Only AO and DO have a local flag. Set the flag when some or all of the outstation's digital output points are in the Local state. This means that the Outstation's control outputs are *not* accessible through the DNP protocol. Clear the flag when the Outstation is in the Remote state. This means that the Outstation's control outputs are accessible through the DNP protocol. A String object has four data types, for example, String(20), String(60), String(100), and String(250). You can write values to and read values from string object points.
Data Type	Boolean for DI and DO signals. Short, Integer, and Float for AI and DO signals.
Storage Type	HL (high byte first, low byte next) LH (low byte first, high byte next)
Event Type	Objects may be assigned to a class. There are four classes of data. Class 0 is reserved for static data objects. Static data reflects the current value of data in the outstation (a slave station in a SCADA system). Class 1, 2, and 3 are reserved for event data objects. These objects are created as the result of data changes in the Outstation or some other stimulant. Each event object can be assigned to Class 1, 2 or 3. Objects may be grouped in Classes by priority, which is determined by the user, and the data classes may be polled at varying rates.

5. To add a data point into a session, select the check box for the session in the corresponding row.
   For example, if you want to add data point 2 into session 03, select the check box as shown.



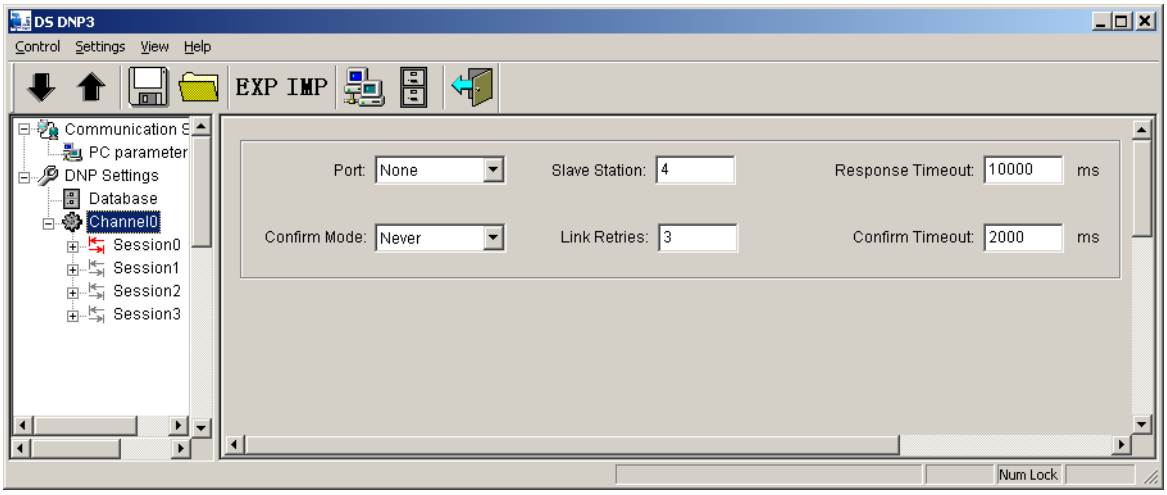
To remove a data point from a session, clear the check box for the session in the corresponding row.

Configure a DS DNP3 Channel

Follow these steps to configure a port on the DataSite controller for DNP3 communication.

1. Open the DNP Settings tree.
2. In the DNP Settings tree, click Channel 0.

   The dialog box for configuring DNP3 channels appears.



3. Set up the following parameters according to your requirements. The following table provides the description, range and default value of each parameter. Configure DS DNP3 Sessions

DS DNP3 Channel parameters

Variable	Description	Range of Options or Values	Default Value
Port	Communication interface	None, Net0, COM1, COM2	None(1)
Slave Station	Channel station number (slave station number)	0…65535	3
Confirmed Mode	Operation desired for a specific communication session. This function is used for protocols that support breaking an application layer message into multiple link layer frames.	Never: Not for any frame Multi_frame: Only for multiframe message fragments Always: For all frames	Never
Link Retries	Maximum number of link layer retries if the link layer confirmation times out.	0…255	3
Confirm Timeout	Maximum amount of time, in milliseconds, to wait for a link level confirmation if it is requested.	0…10000	2000
Response Timeout	Maximum amount of time, in milliseconds, to wait for a channel response.	0…30000	2000

(1) If you select "None", all of the upload/download data points shown will not be selected.

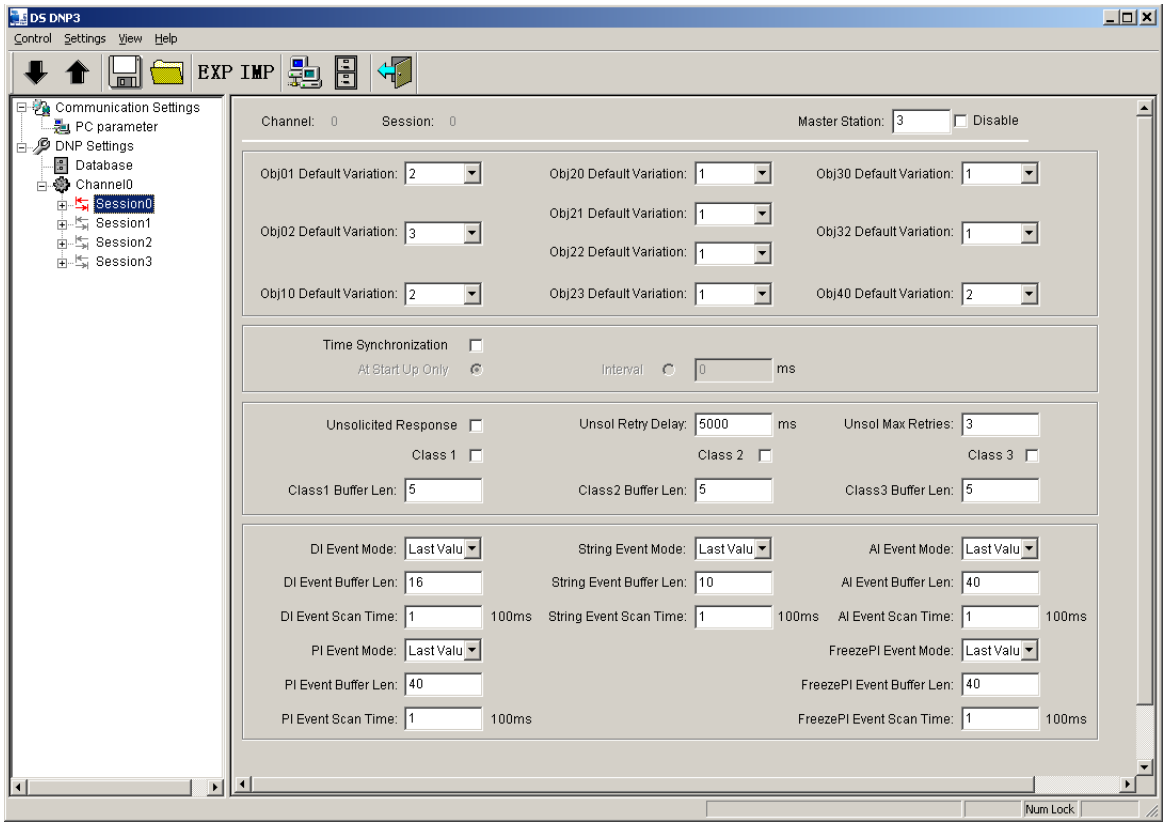
Configure a DS DNP3 session

The DataSite controller allows up to four sessions to be executed simultaneously. This means, when there is a slave station with multiple master stations, the slave station can connect up to four master stations.

Follow these steps to configure a DNP3 session.

1. Select the session you want to configure from the navigation pane.

   The settings dialog box for the selected session appears.



2. In the Station box, enter the number of the master station.

   This is the communication address of the host computer.

TIP 65533 and 65534 are addresses used for broadcast. 65535 is reserved by the system. These three addresses cannot be used for session stations.

TIP

If the Unsolicited Response check box was selected, the controller works in a self-reporting mode and sends unsolicited information to the master station automatically. In this mode of operation, the connection between controller and master station is very important. In a case where the connection has failed, the events will be saved in the events buffer. After the connection is restored, the saved events will be sent to the master station. However, if many events are accumulated in the buffer, more CPU time is needed to process the saved events. If a new event occurs during this period, there is a possibility that the event will not be captured if it is present for a very brief period of time.

3. Enter the event buffer lengths in the Class1 Buffer Len, Class2 Buffer Len, and Class3 Buffer Len boxes.

   Each event buffer length for AI, DI, and PI specifies the maximum number of events buffered by the DataSite controller. The valid values for this parameter are 0…2000.
   The String event buffer length is 0…10 events.

4. Enter the initial value of the object variable in the corresponding boxes.

   See this table for the list of SDNP3 objects and their descriptions.

SDNP3 object library

Object No.	Variant No.	Description
1	0	Binary input - all variants
1	1	Binary input
1	2	Binary input with states
2	0	Binary Input changes - all variants
2	1	Binary input changes without time
2	2	Binary input changes with time
2	3	Binary input changes with relative time
10	0	Binary output state - all variants
10	1	Binary output
10	2	Binary output state
12	1	Control relay output block
12	2	Pattern control block
12	3	Pattern mask
20	0	All variants
20	1	32-bit binary counter

SDNP3 object library (Continued)

Object No.	Variant No.	Description
20	2	16-bit binary counter
20	5	32-bit counter without flag
20	6	16-bit counter without flag
21	0	All variants
21	1	32-bit binary freeze counter
21	2	16-bit binary freeze counter
21	5	32-bit freeze counter
21	6	16-bit freeze counter
22	0	All variants
22	1	32-bit binary counter change event without time
22	2	16-bit binary counter change event without time
22	5	32-bit binary counter change event with time
22	6	16-bit binary counter change event with time
23	0	All variants
23	1	32-bit freeze counter change event without time
23	2	16-bit freeze counter change event without time
23	5	32-bit freeze counter change event with time
23	6	16-bit freeze counter change event with time
30	0	Analog input - all variants
30	1	32-bit analog input
30	2	16-bit analog input
30	3	32-bit analog input without signs
30	4	16-bit analog input without signs
30	5	Short floating-point
32	0	Analog change events - all variants
32	1	32-bit analog change events without time
32	2	16-bit analog change events without time
32	3	32-bit analog change events with time
32	4	16-bit analog change events with time
32	5	Short floating-point analog change events without time
32	7	Short floating-point analog change events with time
40	0	Analog output state (variant 0 is used to request for default variant)
40	1	32-bit analog output state
40	2	16-bit analog output state

SDNP3 object library (Continued)

Object No.	Variant No.	Description
40	3	Short floating-point analog output state
50	0	Time and date
50	1	Time and date
51	1	Time and date CTO
80	1	Internal indications
110	String length	Octet string object
111	String length	Octet string event object

5. If you want the host computer to check the RTC of the DataSite controller periodically, select the Time Synchronization box. Then, in the Interval box, specify how often you want the host computer to check the RTC of the controller. The value range of the Interval parameter is 0…999999999 and the default value is 1800000. Interval parameter is 0 when you select the At Start Up Only check box.

6. Enter the values for the DI, AI, and String events accordingly.

Event parameters

Parameter	Description	Range of Options or Values
Event mode	Event reporting mode	Last value: Only one event is retained in the buffer for each point. Queue: All events will be retained.
Event buffer length	Maximum number of events buffered by the controller	0…2000 for DI and AI events. 0…10 for String events.
Event scan time	Interval of the controller scanning the events	0…99999

Download the Configuration file

For a new DNP3 configuration to take effect, the configuration file needs to be downloaded to the DataSite controller after editing.

Follow this step to download the DNP3 configuration.

- From the Control menu, choose Download.

  You can also click the Download button  on the toolbar.

Upload the Configuration file

To view the DNP3 configuration of the DataSite controller, upload it to the PC.

Follow this step to upload the DNP3 configuration.

- From the Control menu, choose Upload.

  You can also click the Upload button  on the toolbar.

Save the Configuration file

The DNP3 configuration file can also be saved into a file. In this way, when you want to apply this configuration to a different DataSite controller, you can download the configuration file directly to the controller, instead of re-creating the configuration from scratch.

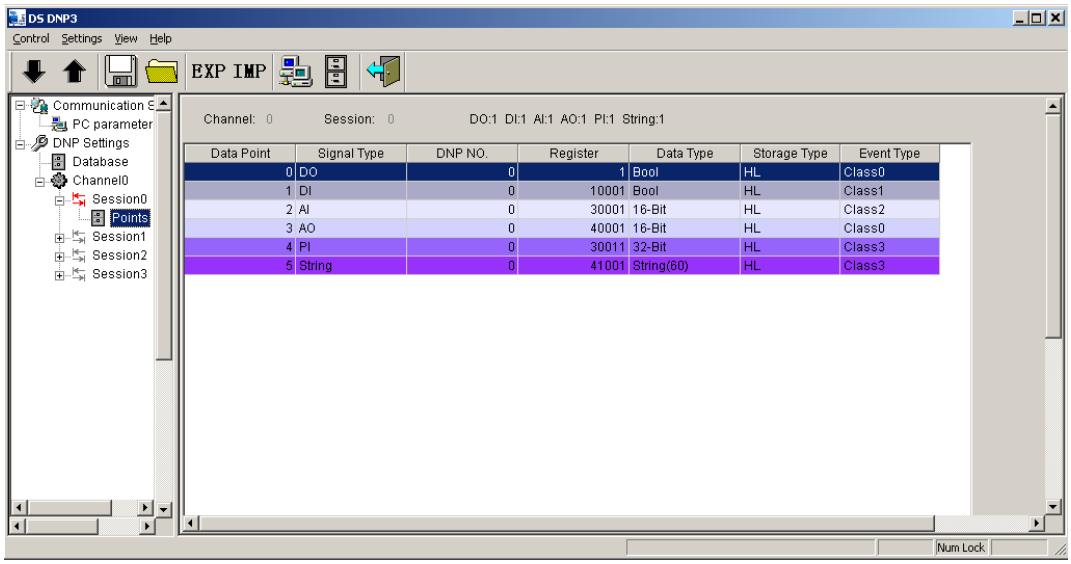
To save the current configuration file:

1. Start DS DNP3.

   The current configuration files are opened. If there are no configuration files, save the current configuration file to the current directory.

2. From the Control menu, choose Save.

   You can also click the Save button  on the toolbar.


DS DNP3
Control Settings View Help
EXP IMP
Communication S
PC parameter
DNP Settings
Database
Channel0
Session0
Points
Session1
Session2
Session3
Channel: 0 Session: 0 DO:1 DI:1 AI:1 AO:1 PI:1 String:1
Data Point Signal Type DNP NO. Register Data Type Storage Type Event Type
0 DO 0 1 Bool HL Class0
1 DI 0 10001 Bool HL Class1
2 AI 0 30001 16-Bit HL Class2
3 AO 0 40001 16-Bit HL Class0
4 PI 0 30011 32-Bit HL Class3
5 String 0 41001 String(60) HL Class3
Num Lock

Operation and Data Validation Example

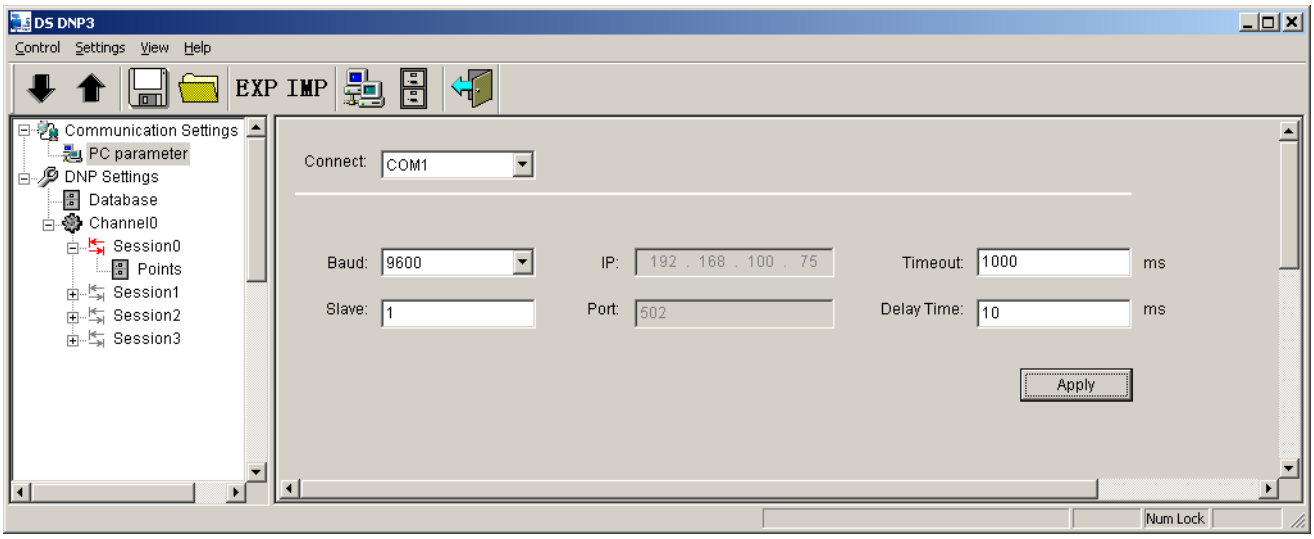
If you want to communicate with the DataSite controller through TCP/IP by using the DNP3 protocol, you need to have four data points each for AI, DI, AO, and DO to send unsolicited responses. You need to configure the controller as having one slave and multiple masters. The following is an example to help you understand the use of DS DNP3 better.

Example

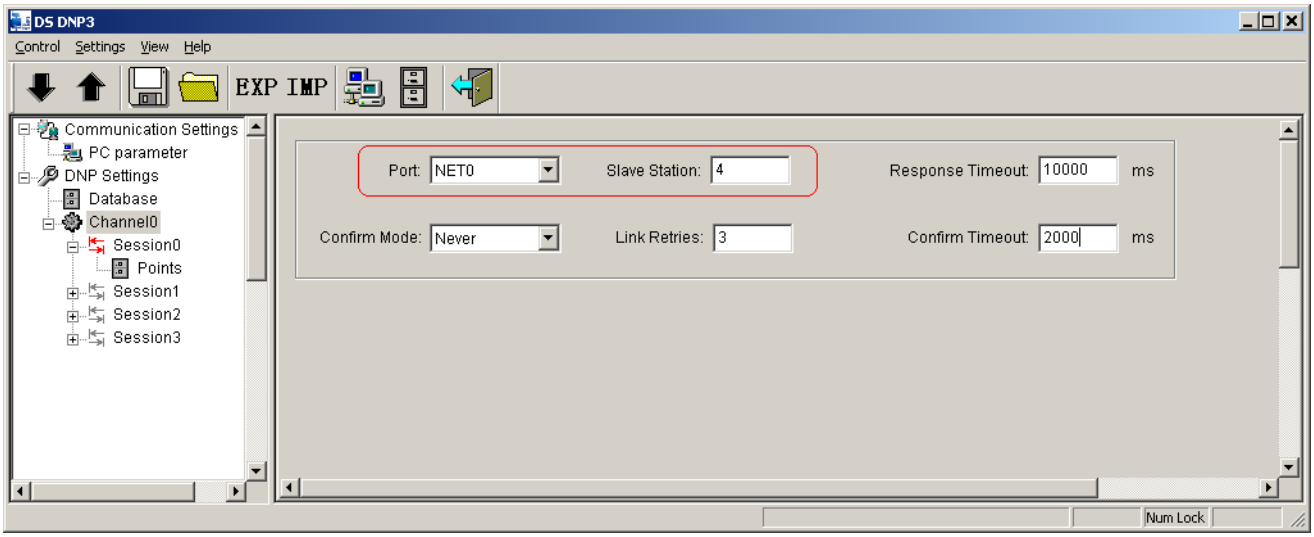
The system includes one outstation and four master stations. This means one DataSite controller communicates with four DNP3 hosts over a physical channel. The DNP3 address for the outstation is 4. The DNP3 addresses for the four master stations are 3, 4, 5, and 6 respectively. The outstation connects with the master stations via Ethernet. There are four data points on the outstation. The outstation works in unsolicited mode.

The configuration procedure is as follows.

Step 1: Configure the PC parameters as follows.



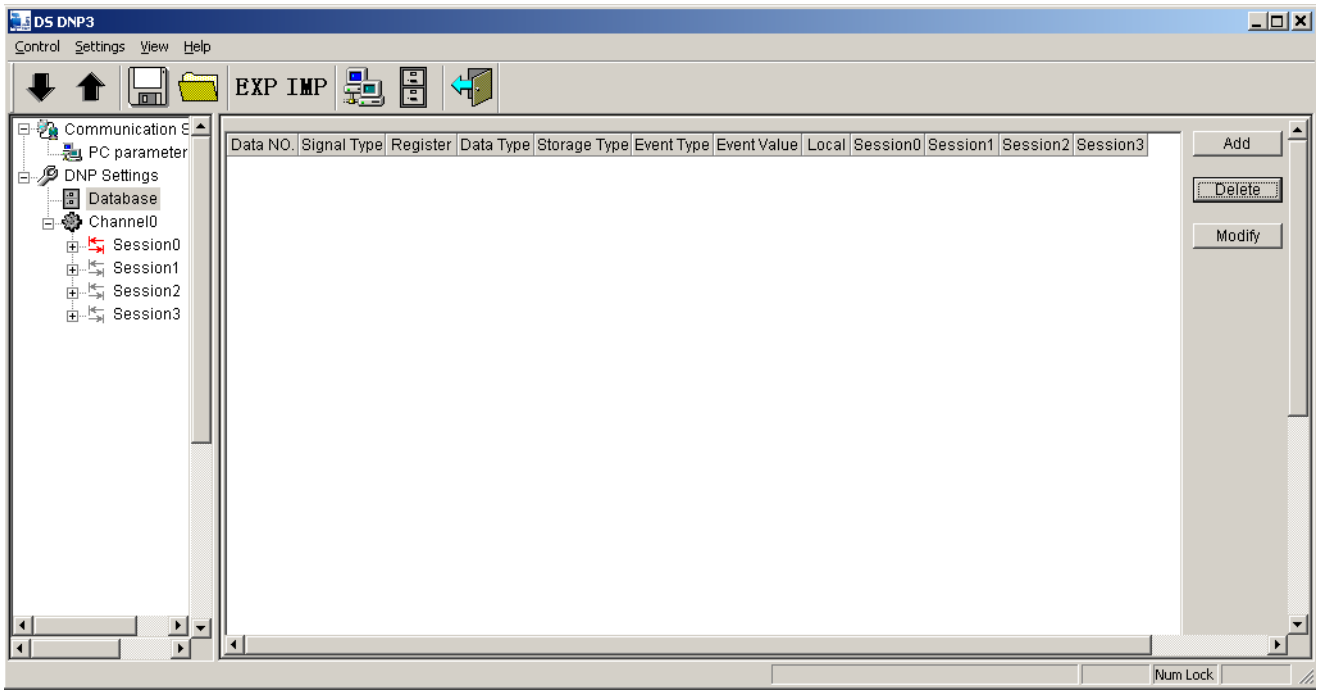
Step 2: Configure the channel as follows. You should select "NET0" for DNP3 communication and set the DNP3 slave address as '4'.



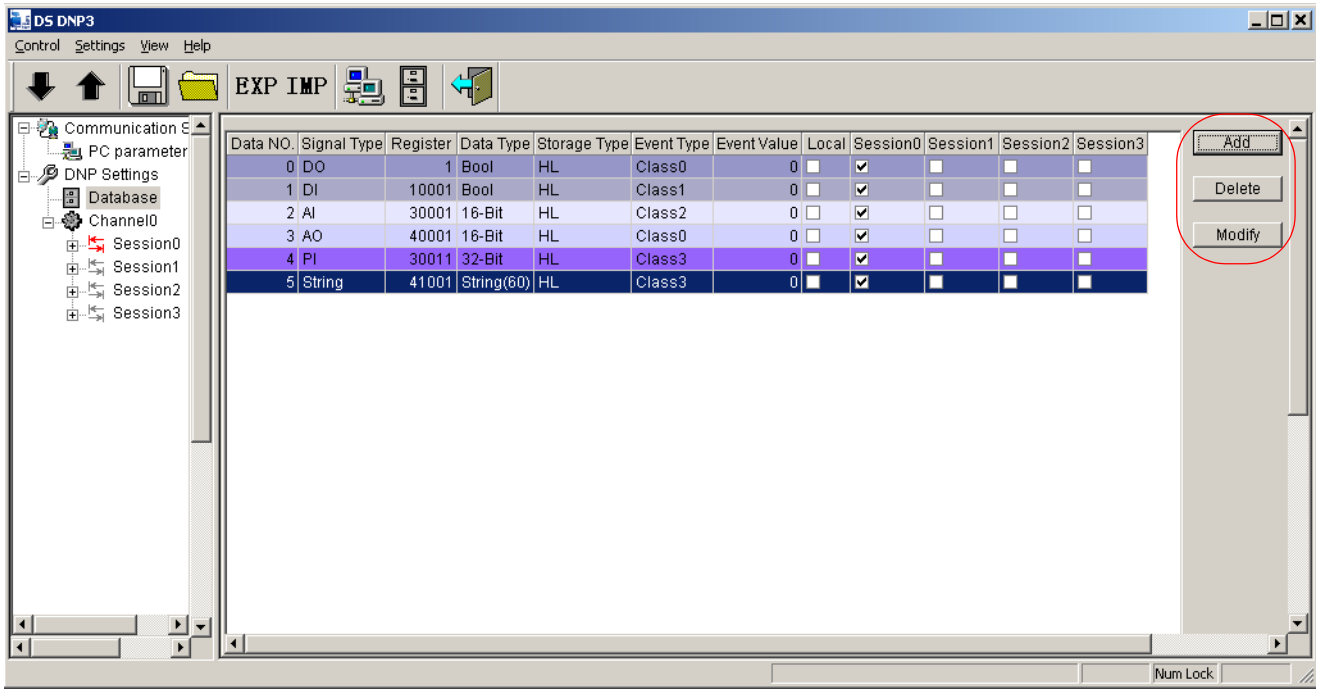
Step 3: Configure the data points in the database.

1. Click the Database tree.

   A screen similar to the following appears.



2. Click the Add button for the type of data point you want to add. For example, if you want to add an AI data point, click Add, select AI in the Add dialog box that appears, and click OK. Repeat this step until you have added a data point for each type.

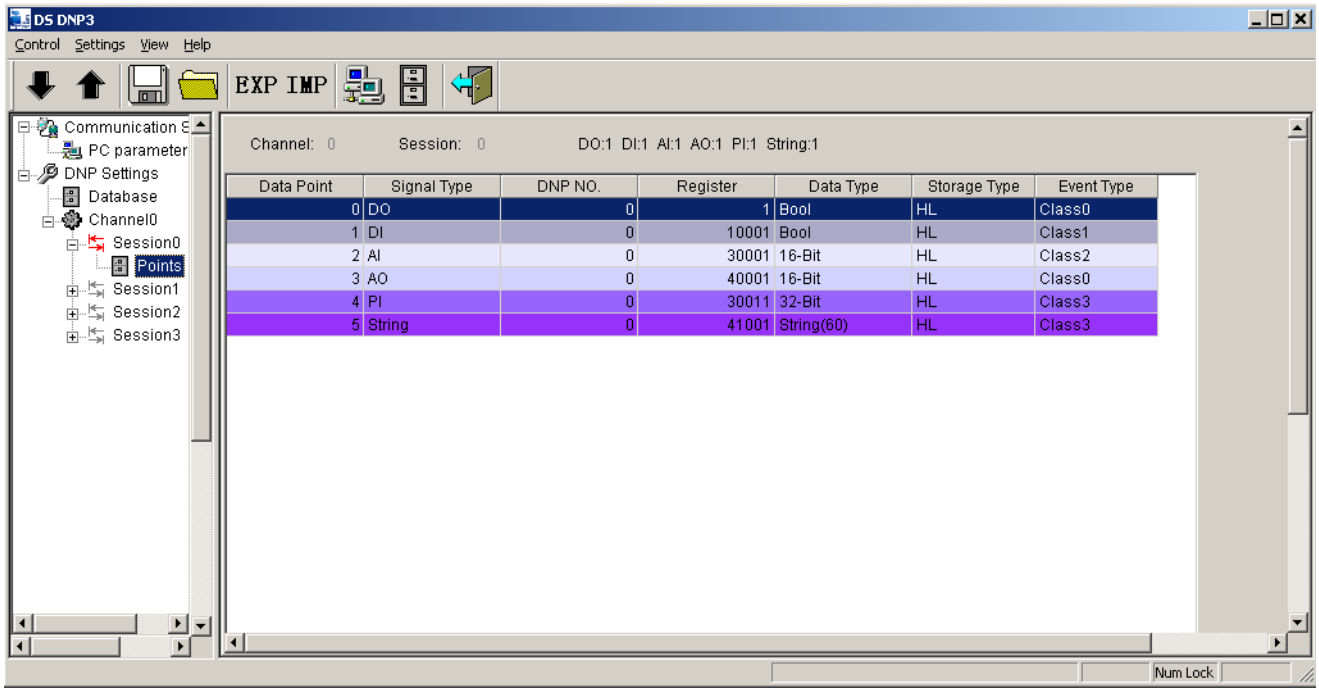


3. Configure the properties for each data point, including the register address, class, and event value.

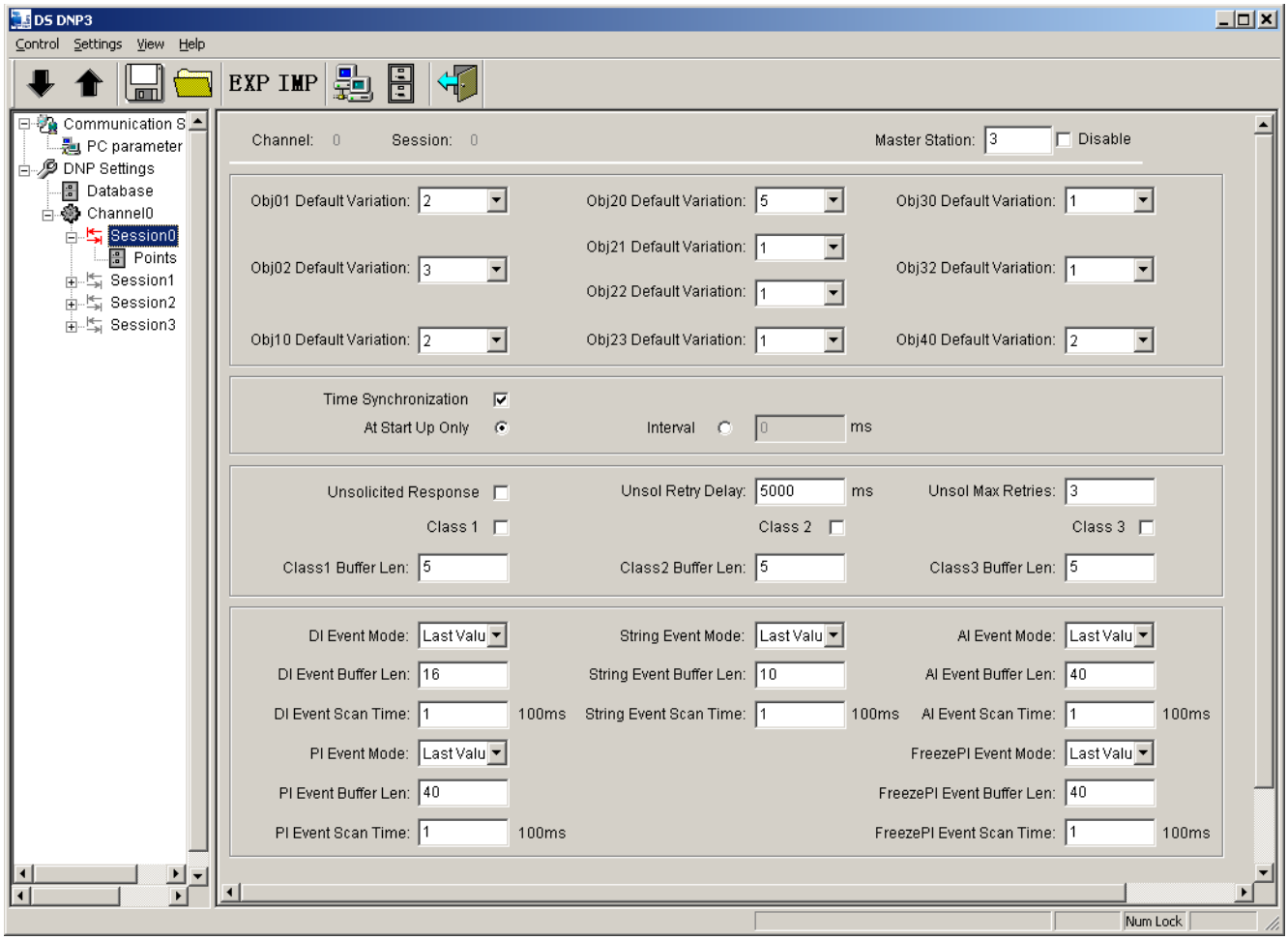
Step 4: Configure the session parameters.

1. Expand the Session0 tree and click Points.

   The data points you have bound in Step 3 are displayed.


DS DNP3
Control Settings View Help
EXP IMP
Communication S
PC parameter
DNP Settings
Database
Channel0
Session0
Points
Session1
Session2
Session3
Channel: 0
Session: 0
DO:1 DI:1 AI:1 AO:1 PI:1 String:1
Data Point | Signal Type | DNP NO. | Register | Data Type | Storage Type | Event Type
0 | DO | 0 | 1 | Bool | HL | Class0
1 | DI | 0 | 10001 | Bool | HL | Class1
2 | AI | 0 | 30001 | 16-Bit | HL | Class2
3 | AO | 0 | 40001 | 16-Bit | HL | Class0
4 | PI | 0 | 30011 | 32-Bit | HL | Class3
5 | String | 0 | 41001 | String(60) | HL | Class3
Num Lock

2. Click the Session0 button to display the parameters for session 0.



3. Select the station address for the session.

   The station address is the address of the DNP3 master. It is 3 for session 0 in this case.

4. Select the objects as described in the table, SDNP3 object library on page 254.

5. Select Last Value for DI and AI Event Mode.

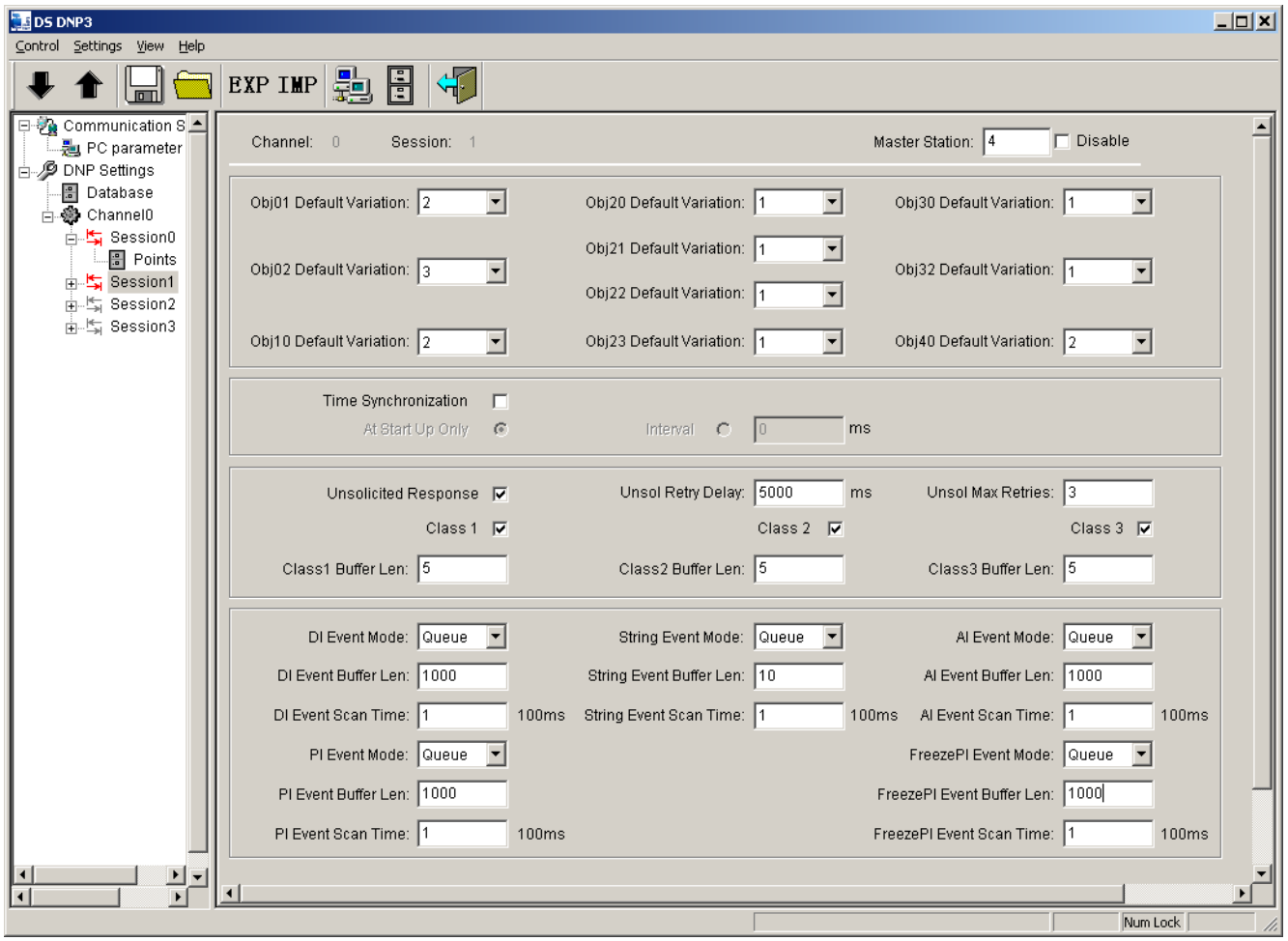
   This means sending the latest value to the DNP3 master.

6. Select the scan time.

7. Select the Unsolicited Response check box.

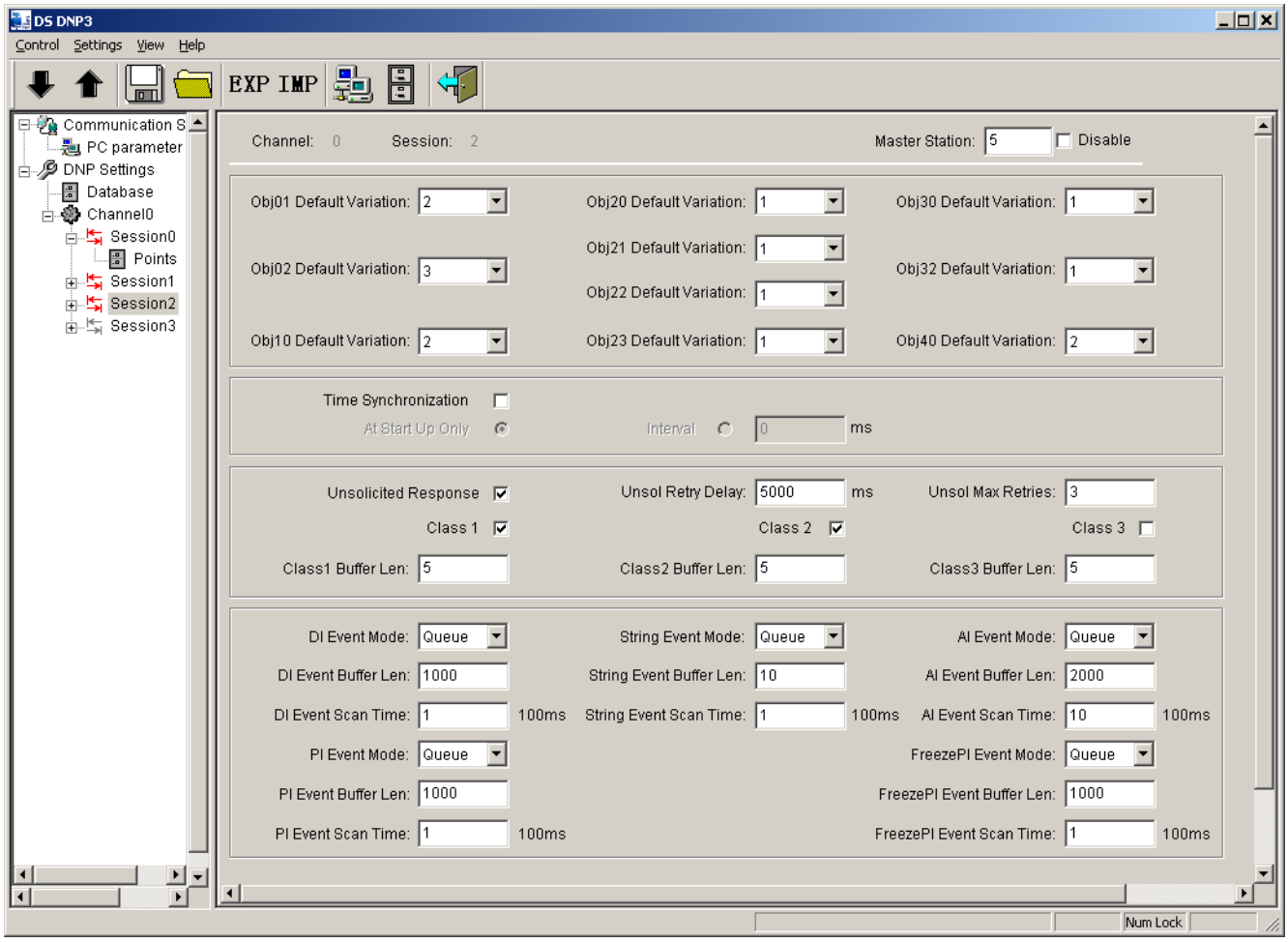
8. Repeat steps 1 through 7 to set the parameters for session 1.

   For session 1, the station address is 4. The controller will send the event to the master immediately as class 1 type, and save the AI and DI events into the buffer in case the connection fails. The buffer length is 1000.



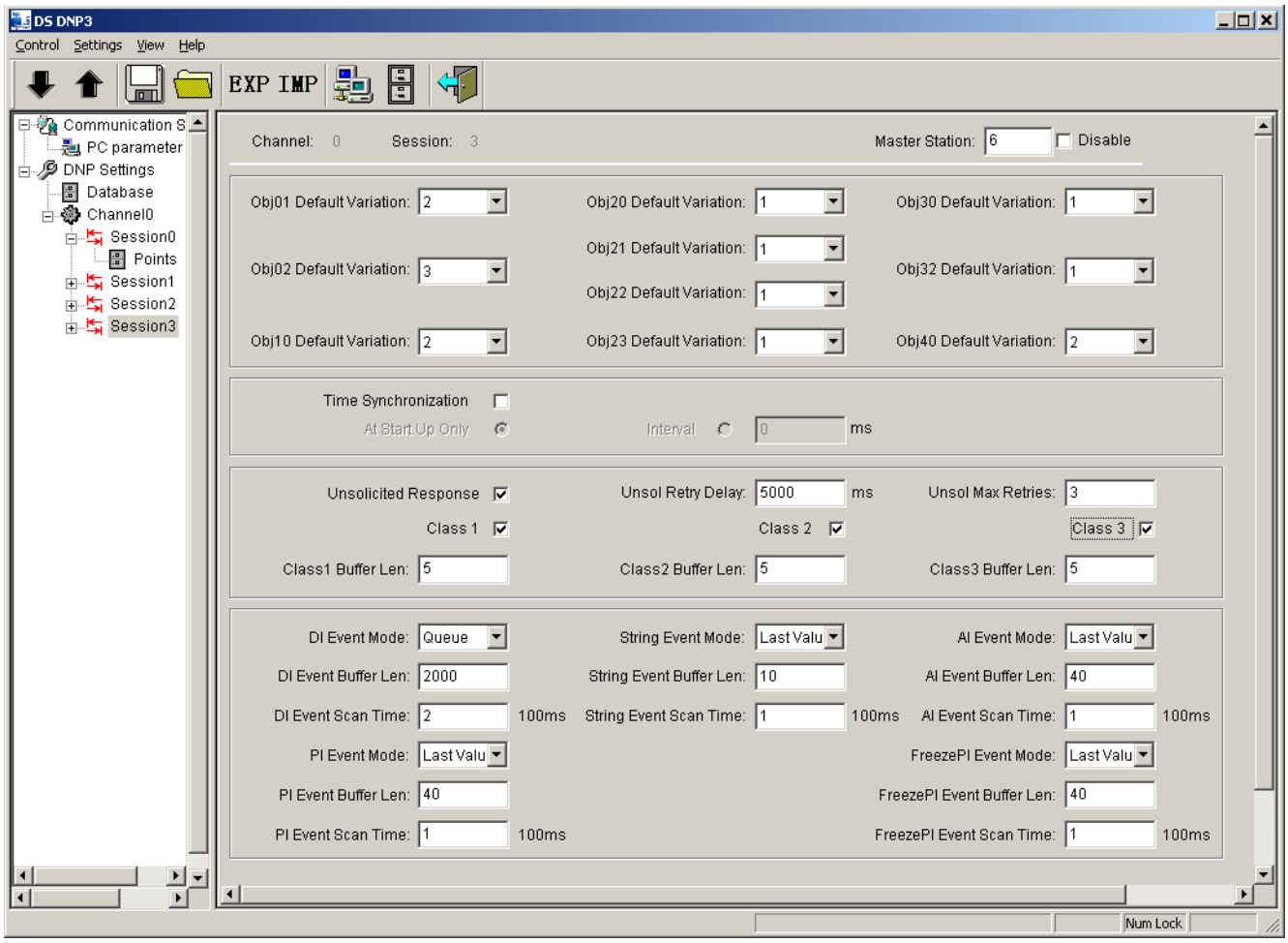
9. Repeat steps 1 through 6 to set the parameters for session 2.

For session 2, the station address is 5. The controller will send the AI change events to the master immediately as class 1 type and save the AI events into the buffer in case the connection fails. The buffer length is 2000 and scan time is 1000 ms. It is not necessary to detect DI events.



10. Repeat steps 1 through 6 to set the parameters for session 3.

For session 3, the station address is 6. The controller will send the DI change events to the master immediately as class 1 type, and save the DI events into the buffer in case the connection fails. The buffer length is 2000 and scan time is 200 ms. It is not necessary to detect AI change events.



Notes:

Extension Modbus Protocol for DataSite Controllers (1758-FLO)

This chapter describes communication with a SCADA system using the Extension Modbus protocol. The Extension Modbus protocol is fully compatible with standard Modbus. All data interchanges, including flow history data, are accomplished using the Extension Modbus protocol.

Modbus Register Definition

The DataSite controller uses the Modbus address to share data between C programs and communication protocols. The section describes the Modbus registers used in the DataSite controller, including general purpose registers and user-assigned registers.

Data formats

Data Type	Number of Registers Required	Description
u_char	1	Unsigned integer in the range 0…255.
u_short	1	Unsigned integer in the range 0…65535.
u_int	2	Unsigned integer in the range 0…4294967295.
float	2	IEEE single precision floating-point number.

Data attributes

Attribute	Description
RW	Read/write
RO	Read-only
W	Write
R	Read

Modbus Register Range

The registers used in the DataSite controller include four types of I/O registers.

Coil registers

Coil registers are single-bit registers located in the digital output section of the I/O database. There are 4096 coil registers numbered from 00001 to 04096.

State registers

State registers are single registers located in the digital input section of the I/O database. There are 4096 state registers numbered 10001 to 14096.

Input registers

Input registers are 16-bit registers located in the analog section of the I/O database. There are 4096 registers numbered 30001 to 34096.

Hold registers

Hold registers are 16-bit registers located in the analog output section of the I/O database. There are 9999 hold registers numbered 40001 to 49999.

Modbus register range

Type	Range	Number of Registers	Attribute
Coil Registers	1…4096	4096	RW
State Registers	10001…14096	4096	RO
Input Registers	30001…34096	4096	RO
Hold Registers	40001…49999	9999	RW

Modbus Registers for Physical I/O Hardware

All of the I/O hardware that is used by the DataSite controller must be assigned to I/O database registers in order for the I/O points to be accessed. They are mapped as below.

Modbus addresses for I/O hardware

Name	Data Type	Modbus Address	Attribute
DI0	BOOL	10001	RO
DI1	BOOL	10002	RO
DI2	BOOL	10003	RO
DI3	BOOL	10004	RO
DI4	BOOL	10005	RO
DI5	BOOL	10006	RO
DI6	BOOL	10007	RO
DI7	BOOL	10008	RO
DI8	BOOL	10009	RO
DI9	BOOL	10010	RO
DI10	BOOL	10011	RO
DO0	BOOL	1	RW
DO1	BOOL	2	RW
DO2	BOOL	3	RW
DO3	BOOL	4	RW
AI0	U_SHORT	30001	RO
AI1	U_SHORT	30002	RO
AI2	U_SHORT	30003	RO
AI3	U_SHORT	30004	RO
AI4	U_SHORT	30005	RO
AI5	U_SHORT	30006	RO
AI6	U_SHORT	30007	RO
AI7	U_SHORT	30008	RO
AO0	U_SHORT	40001	RW
AO1	U_SHORT	40002	RW
PI0	U_INT	30011…30012	RO
PI1	U_INT	30013…30014	RO
PI2	U_INT	30015…30016	RO

Modbus Registers used by the 1758-FLO Controllers

The following registers are used by the 1758-FLO controllers for configuration, display and data archival. These registers are described in the following sections.

Modbus addresses for the 1758-FLO controllers

Modbus Address	Register Contents
30081…30082	Firmware version
30083…30084	Hardware version
30091…30097	Real-time clock (RTC)
30101…30900	Calculation results 1
30901…32100	Reserved by the controller
32101…32900	Flow parameter configuration
32901…32903	Contract time
32911…32917	Time at which power is shut down
32920…33079	Reserved by the controller
33101…33451	Calculation results 2
48000…48400	Gas component parameter
49000…49999	Communication commands and data

Modbus Registers for Firmware and Hardware Version (RO)

Modbus addresses for firmware and hardware versions

Name	Description	Data Type	Modbus Address
Flo_FRN1	Firmware version	u_short	30081
Flo_FRN2			30082
Flo_HRN1	Hardware version	u_short	30083
Flo_HRN2			30084

Modbus Registers for RTC (RO)

Modbus addresses for RTC

Name	Description	Data Type	Modbus Address
rtu_hour	Controller hour	u_short	30091
rtu_minute	Controller minute	u_short	30092
rtu_second	Controller second	u_short	30093
rtu_year	Controller year	u_short	30094
rtu_month	Controller month	u_short	30095
rtu_day	Controller day	u_short	30096
rtu_week	Controller week	u_short	30097

Modbus Registers for Calculation Results (RO)

Modbus addresses for calculation results block 1

Meter Run	Starting Address	Starting Parameter Address	Address Count
0	30101	X	100
1	30201	X + 100	100
2	30301	X + 200	100
3	30401	X + 300	100
4	30501	X + 400	100
5	30601	X + 500	100
6	30701	X + 600	100
7	30801	X + 700	100

Parameters in calculation results block 1

Parameter Name	Description	Data Type	Modbus Addresses for Meter Run 0 Parameters (= X)
DP/PI	Differential pressure real-time acquisition value (AGA3 only), pulse count real-time acquisition value (/sec.) (AGA7 only)	float/u_int	30101…30102
P	Static pressure real-time acquisition value	float	30103…30104
T	Temperature real-time acquisition value	float	30105…30106
avh_dp	Average differential pressure for the hour	float	30107…30108
avh_p	Average static pressure for the hour	float	30109…30110
avh_t	Average temperature for the hour	float	30111…30112
avd_dp	Average differential pressure for the day	float	30113…30114
avd_p	Average static pressure for the day	float	30115…30116
avd_t	Average temperature for the day	float	30117…30118
pi_pre	Total number of pulses for the previous second	u_int	30119…30120
qmh	Transient mass hour flow rate	float	30121…30122
qvbh	Transient volume hour flow rate (base condition)	float	30123…30124
qvfh	Transient volume hour flow rate (flowing condition)	float	30125…30126
qm_today	Mass quantity for the current day	float	30127…30128
qvn_today	Volume quantity in base conditions for the current day	float	30129…30130
qvf_today	Volume quantity in flowing conditions for the current day	float	30131…30132
qm_yesterday	Mass quantity for the previous day	float	30139…30140
qvn_yesterday	Volume quantity in base conditions for the previous day	float	30141…30142
qvf_yesterday	Volume quantity in flowing conditions for the previous day	float	30143…30144
qm_all	Total quantity of mass flow	u_int	30145…30146
qvn_all	Total quantity of volume at base conditions	u_int	30147…30148
qvf_all	Total quantity of volume at flowing conditions	u_int	30149…30150
Ftime_today (cntDay)	Total flow time of the previous day	u_int	30157…30158
cntDay_add	Total flow time of the current day	u_int	30159…30160
Ftime_thishour (cntHour)	Total flow time of last hour	u_int	30161…30162
cntHour_add	Total flow time of the current hour	u_int	30163…30164
Intermediate results			
Zb	Natural gas compressibility factor in base conditions	float	30165…30166
Zf	Natural gas compressibility factor in flowing conditions	float	30167…30168
Gr	Real relative density	float	30177…30178
EXT	Square root of the product of static pressure and differential pressure. This is also the uncorrected volume (AGA7).	float	30199…30200

Modbus addresses for calculation results block 2

Meter Run	Starting Address	Parameter Address	Address Number
0	33101	X	50
1	33151	X + 50	50
2	33201	X + 100	50
3	33251	X + 150	50
4	33301	X + 200	50
5	33351	X + 250	50
6	33401	X + 300	50
7	33451	X + 350	50

Parameters in calculation results block 2

Parameter Name	Description	Data Type	Modbus Addresses for Meter Run 0 Parameters (= X)
qeh_pval	Energy hour flow rate	float	33101…33102
qe_yesterday	Energy flow of the previous day	float	33103…33104
avh_EXT	Hourly average of the square root of the product of static pressure and differential pressure. This is also the average uncorrected volume (AGA7) for the hour.	float	33105…33106
avd_EXT	Daily average of the square root of the product of static pressure and differential pressure. This is also the average uncorrected volume (AGA7) for the day.	float	33107…33108
avh_Gr	Average real relative density for the hour	float	33109…33110
avd_Gr	Average real relative density for the day	float	33111…33112
Y2	Expansion fsactor based on the absolute static pressure measured at the downstream tap	float	33113…33114
Reserved	Reserved	float	33115…33150

Modbus Registers for Flow Configuration Parameters (RO)

Modbus addresses for flow configuration parameters

Meter Run	Starting Address	Parameter Address	Address Number
0	32101	X	100
1	32201	X + 100	100
2	32301	X + 200	100
3	32401	X + 300	100
4	32501	X + 400	100
5	32601	X + 500	100
6	32701	X + 600	100
7	32801	X + 700	100

Flow configuration parameters

Parameter Name	Description	Data Type	Modbus Address of Meter Run 0 = X
Enable	Bit 0: Enable calculation Bit 1: Enable accumulation Bit 2: Parameter modification flag Bit 3: Type of measurement unit. 0: imperial, 1: metric Bit 4: Flag for usage of the automatic component analysis instrument	u_short	32101
CalInterval	Calculation interval	u_short	32102
piInterval	BMP (base multiplier period)	u_short	32103
dp_DPoint	Data point configuration (differential pressure address or pulse)	u_short	32104
p_DPoint	Data point configuration (static pressure address)	u_short	32105
t_DPoint	Data point configuration (temperature address)	u_short	32106
usAGA_Type	AGA calculation method. 0: AGA3, 1: AGA7	u_short	32107
usTapLocation	Tap location 0: Upstream, 1: Downstream	u_short	32108
usPressType	Pressure type 0: Gauge, 1: Absolute	u_short	32109
usZ_mode	AGA8 methods 0: Gas analysis, 1: HV-GR-CO2, 2: GR-CO2-N2	u_short	32110
usOrifice_Type	Orifice material 0: Type 304 and 316 stainless steel, 1: Monel, 2: Carbon steel	u_short	32111
usPipe_Type	Tube material 0: Type 304 and 316 stainless steel, 1: Monel, 2: Carbon steel	u_short	32112
usGr_Type	AGA8 relative density condition type 0: Real, 1: Ideal	u_short	32113

Flow configuration parameters (Continued)

Parameter Name	Description	Data Type	Modbus Address of Meter Run 0 = X
force_flag	Indicate which parameter will use force input. Bit 0: Differential pressure or pulse Bit 1: Static pressure Bit 2: Temperature	u_short	32114
dp_B	Differential pressure B factor for AGA3 calculation. This parameter is not used for AGA7 calculation.	float	32115…32116
dp_K	Differential pressure K factor for AGA3 calculation. Pulse K factor for AGA7 calculation.	float	32117…32118
fDp_Cutoff	Cut-off differential pressure for AGA3 calculation.	float	32119…32120
p_B	Static pressure B factor	float	32121…32122
p_K	Static pressure K factor	float	32123…32124
t_B	Temperature B factor	float	32125…32126
t_K	Temperature K factor	float	32127…32128
fAGA_Pb	Base pressure	float	32129…32130
fAGA_Tb	Base temperature	float	32131…32132
fdr_Orifice	Orifice diameter	float	32133…32134
fTr_dr_Orifice	Orifice reference temperature	float	32135…32136
fDr_Pipe	Tube diameter	float	32137…32138
fTr_Dr_Pipe	Tube reference temperature	float	32139…32140
fBarometric	Atmospheric pressure	float	32141…32142
fHeatVal	Heat value	float	32143…32144
fT_M_HeatVal	Heat value reference temperature	float	32145…32146
fGr	Relative density	float	32147…32148
fP_M_Gr	Relative density reference pressure	float	32149…32150
fT_M_Gr	Relative density reference temperature	float	32151…32152
DP_address_type	DP register data type 0 = ushort, 1 = float	u_short	32153
P_address_type	P register data type 0 = ushort, 1 = float	u_short	32154
T_address_type	T register data type 0 = ushort, 1 = float	u_short	32155
Interval	Interval for collection the components from analysis instrument automatically	u_short	32156
—	Reserved	—	32157…32158
x_ch4	Methane	float	32159…32160
x_n2	Nitrogen	float	32161…32162
x_co2	Carbon dioxide	float	32163…32164
x_c2h6	Ethane	float	32165…32166

Flow configuration parameters (Continued)

Parameter Name	Description	Data Type	Modbus Address of Meter Run 0 = X
x_c3h8	Propane	float	32167…32168
x_h20	Water	float	32169…32170
x_h2s	Hydrogen sulfide	float	32171…32172
x_h2	Hydrogen	float	32173…32174
x_co	Carbon monoxide	float	32175…32176
x_o2	Oxygen	float	32177…32178
x_ic4h10	i-Butane	float	32179…32180
x_nc4h10	n-Butane	float	32181…32182
x_ic5h12	i-Pentane	float	32183…32184
x_nc5h12	n-Pentane	float	32185…32186
x_nc6h14	n-Hexane	float	32187…32188
x_nc7h16	n-Heptane	float	32189…32190
x_nc8h18	n-Octane	float	32191…32192
x_nc9h20	n-Nonane	float	32193…32194
x_nc10h22	n-Decane	float	32195…32196
x_he	Helium	float	32197…32198
x_ar	Argon	float	32199…32200

Modbus Registers for Contract Time

The contract time is the time when daily records are saved.

Modbus registers for contract time

Description	Data Type	Modbus Address
Contract hour	u_short	32901
Contract minute	u_short	32902

Modbus Registers for the Power Shutdown Time

These registers record the previous shutdown time of the controller.

Modbus registers for power shutdown time

Description	Data Type	Modbus Address
Hour for power off	u_short	32911
Minute for power off	u_short	32912
Second for power off	u_short	32913

Modbus Registers for Reading Gas Component Parameters

The gas component parameters can be read from a gas component analyzer automatically by using Modbus Master scan blocks. Refer to Settings on page 35 for details on using the Modbus Master scan block. The registers on the following table are used for saving the parameters read from the gas component analyzer.

Modbus registers for reading gas component parameter

Modbus Addresses in 1758-FLO Controller		Description
Datasite FLO used register	user defined register when using Modbus Master Scan	
32159…32200	48001…48050	Component of meter run 0 (see Offset structure table on page 277)
32259…32300	48051…48100	Component of meter run 1
32359…32400	48101…48150	Component of meter run 2
32459…32500	48151…48200	Component of meter run 3
32559…32600	48201…48250	Component of meter run 4
32659…32700	48251…48300	Component of meter run 5
32759…32800	48301…48350	Component of meter run 6
32859…32900	48351…48400	Component of meter run 7

Offset structure table

Data Type	Offset	Name	Description
float	0	CH4	Methane
float	1	N2	Nitrogen
float	2	CO2	Carbon dioxide
float	3	C2H6	Ethane

Offset structure table (Continued)

Data Type	Offset	Name	Description
float	4	C3H8	Propane
float	5	H2O	Water
float	6	H2S	Hydrogen sulfide
float	7	H2	Hydrogen
float	8	CO	Carbon monoxide
float	9	O2	Oxygen
float	10	iC4H10	i-Butane
float	11	nC4H10	n-Butane
float	12	iC5H12	i-Pentane
float	13	nC5H12	n-Pentane
float	14	nC6H12	n-Hexane
float	15	nC7H16	n-Heptane
float	16	nC8H18	n-Octane
float	17	nC9H20	n-Nonane
float	18	nC10H22	n-Decane
float	19	HE	Helium
float	20	AR	Argon

Range of parameter values (Sum of all components must be within 1 +/- 0.0001)

No.	Name	Range (in %)	
		AGA8 Detailed Method	AGA8 Gross Method 1 and 2
1	CH4	0…100	—
2	N2	0…100	0…53.6
3	CO2	0…100	0…28.94
4	C2H6	0…100	—
5	C3H8	0…12	—
6	H2O	0…3	—
7	H2S	0…100	—
8	H2	0…100	0…100
9	CO	0…3	0…3
10	O2	0…21	—
11	iC4H10	0…6	—
12	nC4H10		

Range of parameter values (Sum of all components must be within 1 +/- 0.0001

No.	Name	Range (in %)	
		AGA8 Detailed Method	AGA8 Gross Method 1 and 2
13	iC5H12	0…4	—
14	nC5H12		
15	nC6H12	0…4	—
16	nC7H16		
17	nC8H18		
18	nC9H20		
19	nC10H22		
20	HE	0…3	—
21	AR	0…1	—

Modbus registers for SCADA communication

Modbus Register	Description
49000…49999	Registers used by the Extension Modbus protocol for communication with the SCADA system. A description of these registers is provided in the next section.

Addresses Associated with the Extension Modbus Protocol Commands

The two blocks, buffer 1 and buffer 2, have different meanings for different commands. The following table provides the register address, data type, attribute and description for each command.

Register addresses for Extension Modbus protocol commands

Address	Data Type	Attribute	Description
49025	u_short	RW	Command number (> 0)
49026	u_short	R	Return code (0 = OK)
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user. Default is 0.
49030… 49034	undetermined	RW	Command parameter block buffer 1, 5 registers
49035… 49290	undetermined	RW	Command parameter block buffer 2, 256 registers

Pass Code for User

When the host computer communicates with the 1758-FLO DataSite controller, you need to use the pass code to protect data. If you lose the password, you can read it from the register 33001…33002. It is a long UINT integer. The default value is zero.

Command List

Extension Modbus protocol commands

Command Number	Description
1	Correct time
2	Set pass code
3	Set device name
4	Read device name
5	Disable/enable meter run
6	Read disable/enable setting of meter run
7	Set transaction (contract) time
8	Read transaction (contract) time
9	Set signal test
10	Read signal test settings and values
11	Disable/enable accumulation calculation of meter run
12	Read disable/enable setting of accumulation calculation of meter run
13	Set input parameters (AI/PI/Pulse)
14	Read input parameter settings (AI/PI/Pulse)
15	Set input parameter alarm range
16	Read input parameter alarm range
17	Set calculation input parameters
18	Read calculation input parameter settings
19	Set gas component parameters
20	Read gas component parameter settings
21	Reset accumulation
22	Read daily history recording
23	Read hourly history recording
24	Read alarm logs
25	Read new alarm logs
26	Read event logs
27	Read new event logs
28	Disable/enable the automatic component analysis instrument
29	Read the flag of the automatic component analysis instrument
30	Acknowledge alarms
31	Acknowledge events
32…355	Reserved

Command Number 1: Correct the System Time

Use command number 1 to set up the system time of the 1758-FLO DataSite controllers.

IMPORTANT Enter a valid time, such as 2009-2-21 13:59:00. The day of the week should correspond to the date.

Parameters for command number 1

Address	Data Type	Attribute	Description
49025	u_short	RW	1
49026	u_short	R	Return code
49027	u_short	W	Reserved
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	W	Year (0…99)
49036	u_short	W	Month (01…12)
49037	u_short	W	Day (01…31)
49038	u_short	W	Hour (00…23)
49039	u_short	W	Minute (00…59)
49040	u_short	W	Second (00…59)
49041	u_short	W	Week (01…07)

Event codes for command number 1

Event Name	Event Code
EVENT_SETDATE	5
EVENT_SETTIME	6

Return codes for command number 1

Return Code	Description
00	OK
01	Year invalid
02	Month invalid
03	Day invalid
04	Hour invalid
05	Minute invalid
06	Second invalid
07	Week invalid
100	Pass code is wrong
Other	Invalid

Command Number 2: Set the Pass Code

Use command number 2 to set a new pass code. The default pass code is 0.

Parameters for command number 2

Address	Data Type	Attribute	Description
49025	u_short	RW	2
49026	u_short	R	Return code
49027	u_short	W	Reserved
49028	u_int	W	Pass code for user Default is 0.
49030…49034	—	—	Reserved
49035	u_int	W	New pass code

There is no event code for command number 2.

Return codes for command number 2

Return Code	Description
00	OK
100	Pass code is incorrect
Other	Invalid

Command Number 3: Set the Device Name

Use command number 3 to set the device name of the 1758-FLO DataSite controllers. The maximum string length is eight characters.

Parameters for command number 3

Address	Data Type	Attribute	Description
49025	u_short	RW	3
49026	u_short	R	Return code
49027	u_short	W	Reserved
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	W	Device name 1
49036	u_short	W	Device name 2
49037	u_short	W	Device name 3
49038	u_short	W	Device name 4
49039	u_short	W	Device name 5
49040	u_short	W	Device name 6
49041	u_short	W	Device name 7
49042	u_short	W	Device name 8

There is no event code for command number 3.

Return codes for command number 3

Return Code	Description
00	OK
100	Pass code is incorrect
Other	Invalid

Command Number 4: Read the Device Name

Use command number 4 to read the device name of the 1758-FLO DataSite controllers. The maximum string length is eight characters.

Parameters for command number 4

Address	Data Type	Attribute	Description
49025	u_short	RW	4
49026	u_short	R	Return code
49027	u_short	W	Reserved

Parameters for command number 4 (Continued)

Address	Data Type	Attribute	Description
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	R	Device name 1
49036	u_short	R	Device name 2
49037	u_short	R	Device name 3
49038	u_short	R	Device name 4
49039	u_short	R	Device name 5
49040	u_short	R	Device name 6
49041	u_short	R	Device name 7
49042	u_short	R	Device name 8

There is no event code for command number 4.

Return codes for command number 4

Return Code	Description
00	OK
100	Pass code is incorrect
Other	Invalid

Command Number 5: Disable/Enable the Flow Calculation

Use command number 5 to enable or disable the flow calculation for a meter run.

Parameters for command number 5

Address	Data Type	Attribute	Description
49025	u_short	RW	5
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	W	0: Disable 1: Enable

Event codes for command number 5

Event Name	Event Code
EVENT_RUN_ENABLE	11
EVENT_RUN_DISABLE	12

Return codes for command number 5

Return Code	Description
00	OK
01	Meter run is invalid
02	Input value is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 6: Read the Disable/Enable Flow Calculation Setting

Use command number 6 to read the disable/enable setting of the flow calculation for a meter run.

Parameters for command number 6

Address	Data Type	Attribute	Description
49025	u_short	RW	6
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	R	0: Disable 1: Enable

There is no event code for command number 6.

Return codes for command number 6

Return Code	Description
00	OK
01	Meter run is invalid
100	Pass code is wrong
Other	Invalid

Command Number 7: Set the Transaction (Contract) Time

Use command number 7 to set the transaction (contract) time. The daily record will be saved at the contract time every day.

Parameters for command number 7

Address	Data Type	Attribute	Description
49025	u_short	RW	7
49026	u_short	R	Return code
49027	u_short	W	Reserved
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	W	Contract hour (0…23)
49036	u_short	W	Contract minute (0…59)
49037	u_short	—	Reserved

There is no event code for command number 7.

Return codes for command number 7

Return Code	Description
00	OK
01	Contract hour is invalid
02	Contract minute is invalid
100	Pass code is wrong
Other	Invalid

Command Number 8: Read the Transaction (Contract) Time

Use command number 8 to read the transaction (contract time). The daily record will be saved at the contract time every day.

Parameters for command number 8

Address	Data Type	Attribute	Description
49025	u_short	RW	8
49026	u_short	R	Return code
49027	u_short	W	Reserved
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved

Parameters for command number 8 (Continued)

Address	Data Type	Attribute	Description
49035	u_short	R	Contract hour (0…23)
49036	u_short	R	Contract minute (0…59)
49037	u_short	—	Reserved

There is no event code for command number 8.

Return codes for command number 8

Return Code	Description
00	OK
100	Pass code is wrong
Other	Invalid

Command Number 9: Set Up the Input Signal Test

Use command number 9 to set up the input signal test for one meter run.

Parameters for command number 9

Address	Data Type	Attribute	Description
49025	u_short	RW	9
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	W	Whether differential pressure or pulse tested. 0: No test 1: Test
49036	u_short	W	Whether static pressure tested. 0: No test 1: Test
49037	u_short	W	Whether temperature tested. 0: No test 1: Test
49038	float	W	Differential pressure or pulse test value
49040	float	W	Static pressure test value
49042	float	W	Temperature test value

There is no event code for command number 9.

Return Codes for Command number 9

Return Code	Description
00	OK
01	Meter run is invalid
02	The value for differential pressure or pulse tested is invalid
03	The value for static pressure tested is invalid
04	The value for temperature tested is invalid
100	Pass code is wrong
Other	Invalid

Command Number 10: Read the Input Signal Test

Use command number 10 to read the signal test settings and test values.

Parameters for command number 10

Address	Data Type	Attribute	Description
49025	u_short	RW	10
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	R	Whether differential pressure or pulse is tested. 0: No test 1: Test
49036	u_short	R	Whether static pressure is tested. 0: No test 1: Test
49037	u_short	R	Whether temperature is tested. 0: No test 1: Test
49038	float	R	Test value for differential pressure or pulse
49040	float	R	Test value for static pressure
49042	float	R	Test value for temperature

There is no event code for command number 10.

Return codes for command number 10

Return Code	Description
00	OK
01	Meter run is invalid
100	Pass code is wrong
Other	Invalid

Command Number 11: Disable/Enable the Accumulation Calculation

Use command number 11 to disable or enable accumulation calculation for a meter run.

Parameters for command number 11

Address	Data Type	Attribute	Description
49025	u_short	RW	11
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	W	Whether accumulation calculation is enabled.

Event codes for command number 11

Event Name	Event Code
EVENT_START_ACCUMULATE	14
EVENT_STOP_ACCUMULATE	15

Return codes for command number 11

Return Code	Description
00	OK
01	Meter run is invalid
02	The value for accumulation input is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 12: Read Disable/Enable Setting for Accumulation Calculation

Use command number 12 to read the disable/enable setting for accumulation calculation for a meter run.

Parameters for command number 12

Address	Data Type	Attribute	Description
49025	u_short	RW	12
49026	u_short	R	Return code
49027	u_short	R	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	R	Whether or not the accumulation calculation is enabled on this meter run.

There is no event code for command number 12.

Return codes for command number 12

Return Code	Description
00	OK
01	Meter run is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 13: Set the Input Parameters

Use command number 13 to set up parameters for pressure, temperature and differential pressure or pulse. These parameters include the data address, type, and factors K and B.

Parameters for command number 13

Address	Data Type	Attribute	Description
49025	u_short	RW	13
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved

Parameters for command number 13 (Continued)

Address	Data Type	Attribute	Description
49035	u_short	W	Address of differential pressure or pulse
49036	u_short	W	Data type of differential pressure or pulse 0: u_short 1: float
49037	float	W	K factor of differential pressure or pulse
49039	float	W	B factor of differential pressure or pulse
49041	u_short	W	Address of pressure
49042	u_short	W	Data type of pressure 0: u_short 1: float
49043	float	W	K factor of pressure
49045	float	W	B factor of pressure
49047	u_short	W	Address of temperature
49048	u_short	W	Temperature data type 0: u_short 1: float
49049	float	W	K factor of temperature
49051	float	W	B factor of temperature

Event codes for command number 13

Event Name	Event Code
EVENT_INPUT_P_Address	39
EVENT_INPUT_PD_Type	40
EVENT_INPUT_P_K	41
EVENT_INPUT_P_B	42
EVENT_INPUT_T_Address	43
EVENT_INPUT_TD_Type	44
EVENT_INPUT_T_K	45
EVENT_INPUT_T_B	46
EVENT_INPUT_DP_Address	47
EVENT_INPUT_DPD_Type	48
EVENT_INPUT_DP_K	49
EVENT_INPUT_DP_B	50

Event codes for command number 13 (Continued)

Event Name	Event Code
EVENT_INPUT_PL_Address	51
EVENT_INPUT_PLD_Type	52
EVENT_INPUT_PL_K	53

Return Codes for Command number 13

Return Code	Description
00	OK
01	Meter run is invalid
02	DP_Aaddress is invalid
03	P_Aaddress is invalid
04	T_Aaddress is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 14: Read the Input Parameters

Use command number 14 to read the parameter settings for pressure, temperature and differential pressure or pulse. These parameters include the data address, type, and factors K and B.

Parameters for command number 14

Address	Data Type	Attribute	Description
49025	u_short	RW	14
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	R	Address of differential pressure or pulse
49036	u_short	R	Data type of differential pressure or pulse 0: u_short 1: float
49037	float	R	k factor of differential pressure or pulse
49039	float	R	b factor of differential pressure or pulse

Parameters for command number 14 (Continued)

Address	Data Type	Attribute	Description
49041	u_short	R	Address of pressure
49042	u_short	R	Data type of pressure 0: u_short 1: float
49043	float	R	k factor of pressure
49045	float	R	b factor of pressure
49047	u_short	R	Address of temperature
49048	u_short	R	Temperature data type 0: u_short 1: float
49049	float	R	k factor of temperature
49051	float	R	b factor of temperature

There is no event code for command number 14.

Return codes for command number 14

Return Code	Description
00	OK
01	Meter run is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 15: Set the Alarm Range of Input Parameters

Use command number 15 to set the upper and lower alarm limits and alarm dead-band of static pressure, temperature, and differential pressure or pulse.

Parameters for command number 15

Address	Data Type	Attribute	Description
49025	u_short	RW	15
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	W	Enable or disable differential pressure or pulse alarm 0: Disable 1: Enable

Parameters for command number 15 (Continued)

Address	Data Type	Attribute	Description
49036	float	W	Upper alarm limit of differential pressure or pulse
49038	float	W	Lower alarm limit of differential pressure or pulse
49040	float	W	Alarm dead-band of differential pressure or pulse
49042	u_short	W	Enable or disable static pressure alarm 0: Disable 1: Enable
49043	float	W	Upper alarm limit of static pressure
49045	float	W	Lower alarm limit of static pressure
49047	float	W	Alarm dead-band of static pressure
49049	u_short	W	Enable or disable temperature alarm 0: Disable 1: Enable
49050	float	W	Upper alarm limit of temperature
49052	float	W	Lower alarm limit of temperature
49054	float	W	Alarm dead-band of temperature

There is no event code for command number 15.

Return codes for command number 15

Return Code	Description
00	OK
01	Meter run is invalid
02	The input value for differential pressure or pulse alarm setting is invalid
03	The input value for static pressure alarmsetting is invalid
04	The input value for disable temperature alarmsetting is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 16: Read the Alarm Range of Input Parameters

Use command number 16 to read the upper and lower alarm limits and alarm dead-band of static pressure, temperature, and differential pressure or pulse.

Parameters for command number 16

Address	Data Type	Attribute	Description
49025	u_short	RW	16
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	R	Whether the alarm for differential pressure or pulse is enabled 0: Disable 1: Enable
49036	float	R	Upper alarm limit of differential pressure or pulse
49038	float	R	Lower alarm limit of differential pressure or pulse
49040	float	R	Alarm dead-band of differential pressure or pulse
49042	u_short	R	Whether the alarm for static pressure is enabled 0: Disable 1: Enable
49043	float	R	Upper alarm limit of static pressure
49045	float	R	Lower alarm limit of static pressure
49047	float	R	Alarm dead-band of static pressure
49049	u_short	R	Whether the alarm for temperature is enabled 0: Disable 1: Enable
49050	float	R	Upper alarm limit of temperature
49052	float	R	Lower alarm limit of temperature
49054	float	R	Alarm dead-band of temperature

There is no event code for command number 16.

Return codes for command number 16

Return Code	Description
00	OK
01	Meter run is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 17: Set Up the Calculation Input Parameters

Use command number 17 to set up the corresponding parameters, excluding the gas component parameters, for one meter run.

Parameters for command number 17

Address	Data Type	Attribute	Description
49025	u_short	RW	17
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	W	Whether the meter run is enabled 0: Disable 1: Enable
49036	u_short	W	Type of measurement units 0: U.S. 1: Metric
49037	u_short	W	Accumulate 0: Do not accumulate 1: Accumulate
49038	u_short	W	Use automatic components analysis instrument 0: Disable 1: Enable
49039	u_short	W	Calculation type 0: AGA3 1: AGA7
49040	u_short	W	Algorithm for the calculation of the compressibility factor 0: Gas Analysis 1: HV-GR-CO2 2: GR-CO2-N2
49041	u_short	W	Run interval

Parameters for command number 17 (Continued)

Address	Data Type	Attribute	Description
49042	u_short	W	Base Multiplier Period (BMP)
49043	float	W	Contract standard reference ratio pressure
49045	float	W	Contract standard reference ratio temperature
49047	float/u_int	W	Cut-off differential pressure or cut-off pulse
49049	u_short	W	Pressure type 0: Gauge 1: Absolute
49050	float	W	Atmospheric pressure
49052	u_short	W	Tap location 0: Upstream 1: Downstream
49053	u_short	W	Orifice material 0: Type 304&316 stainless steel 1: Monel 2: Carbon Steel
49054	float	W	Orifice diameter
49056	float	W	Orifice reference temperature
49058	u_short	W	Tube material 0: Type 304&316 stainless steel 1: Monel 2: Carbon Steel
49059	float	W	Tube diameter
49061	float	W	Tube reference temperature
49063	u_short	W	Relative density type 0: Relative density 1: Ideal density
49064	float	W	Relative density
49066	float	W	Reference pressure for measuring relative density
49068	float	W	Reference temperature for measuring relative density
49070	float	W	AGA8 gas heating value
49072	float	W	Reference temperature for gas heating value
49074	u_short	W	Interval for collecting the components from analysis instrument automatically (valid only when automatic component analysis instrument setting is enabled)

Event codes for command number 17

Event Name	Event Code
EVENT_COMPONENT_SELECT	16
EVENT_INPUT_AGA_Type	17
EVENT_INPUT_Z_Mode	18
EVENT_INPUT_INTERVAL	19
EVENT_INPUT_BMP	20
EVENT_INPUT_AGA_Pb	21
EVENT_INPUT_AGA_Tb	22
EVENT_INPUT_Cutoff	23
EVENT_INPUT_P_Type	24
EVENT_INPUT_Barometric	25
EVENT_INPUT_TapLocation	26
EVENT_INPUT_Hd_Type	27
EVENT_INPUT_Dr_Orifice	28
EVENT_INPUT_T_M_dr	29
EVENT_INPUT_Pd_Type	30
EVENT_INPUT_Dr_Tube	31
EVENT_INPUT_T_M_Dr	32
EVENT_INPUT_Gr_Type	33
EVENT_INPUT_Gr	34
EVENT_INPUT_P_M_Gr	35
EVENT_INPUT_T_M_Gr	36
EVENT_INPUT_HeatVal	37
EVENT_INPUT_T_M_HeatVal	38
EVENT_INPUT_CLT_INTERVAL	76

Return codes for command number 17

Return Code	Description
00	OK
01	Meter run is invalid
02	Disable/enable setting of meter run is invalid
03	Unit of measurement is invalid
04	Accumulate setting is invalid
05	Setting for the use of automatic component analysis instrument is invalid
06	Calculation type is invalid
07	Algorithm selected for the calculation of the compressibility factor is invalid
08	Pressure type is invalid
09	Tap location is invalid
10	Orifice material is invalid
11	Tube material is invalid
12	Relative density type is invalid
13	Interval for collecting the components from analysis instrument automatically is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 18: Read the Calculation Input Parameter

Use command number 18 to read the parameter settings, excluding the gas component parameter settings, for one meter run.

Parameters for command number 18

Address	Data Type	Attribute	Description
49025	u_short	RW	18
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	R	Whether the meter run is enabled 0: Disable 1: Enable

Parameters for command number 18 (Continued)

Address	Data Type	Attribute	Description
49036	u_short	R	Units of measurement 0: U.S. 1: Metric
49037	u_short	R	Accumulate 0: Do not accumulate 1: Accumulate
49038	u_short	R	Use automatic components analysis instrument 0: Disable 1: Enable
49039	u_short	R	Calculation type 0: AGA3 1: AGA7
49040	u_short	R	Algorithm for the calculation of the compressibility factor 0: Gas Analysis 1: HV-GR-CO2 2: GR-CO2-N2
49041	u_short	R	Run interval
49042	u_short	R	Base Multiplier Period (BMP)
49043	float	R	Contract standard reference ratio pressure
49045	float	R	Contract standard reference ratio temperature
49047	float/u_int	R	Cut-off differential pressure, cut-off pulse
49049	u_short	R	Pressure type 0: Gauge 1: Absolute
49050	float	R	Atmospheric pressure
49052	u_short	R	Tap location 0: Upstream 1: Downstream
49053	u_short	R	Orifice material 0: Type 304&316 stainless steel 1: Monel 2: Carbon Steel
49054	float	R	Orifice diameter
49056	float	R	Orifice reference temperature
49058	u_short	R	Tube material 0: Type 304&316 stainless steel 1: Monel 2: Carbon Steel
49059	float	R	Tube diameter
49061	float	R	Tube reference temperature

Parameters for command number 18 (Continued)

Address	Data Type	Attribute	Description
49063	u_short	R	Relative density type 0: Relative density 1: Ideal density
49064	float	R	Relative density
49066	float	R	Reference pressure for measuring relative density
49068	float	R	Reference temperature for measuring relative density
49070	float	R	AGA8 gas heating value
49072	float	R	Reference temperature for gas heating value
49074	u_short	R	Interval for collecting the components from analysis instrument automatically (valid only when automatic component analysis instrument setting is enabled)

There is no event code for command number 18.

Return codes for command number 18

Return Code	Description
00	OK
01	Meter run is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 19: Set Up the Gas Component Parameter

Use command number 19 to set up the gas component parameters for each meter run.

Parameters for command number 19

Address	Data Type	Attribute	Description
49025	u_short	RW	19
49026	u_short	R	Return code 0: OK
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	float	W	CH4
49037	float	W	N2

Parameters for command number 19 (Continued)

Address	Data Type	Attribute	Description
49039	float	W	CO2
49041	float	W	C2H6
49043	float	W	C3H8
49045	float	W	H2O
49047	float	W	H2S
49049	float	W	H2
49051	float	W	CO
49053	float	W	O2
49055	float	W	i-C4H10
49057	float	W	n-C4H10
49059	float	W	i-C5H12
49061	float	W	n-C5H12
49063	float	W	n-C6H14
49065	float	W	n-C7H16
49067	float	W	n-C8H18
49069	float	W	n-C9H20
49071	float	W	n-C10H22
49073	float	W	HE
49075	float	W	AR

Event code for command number 19

Event Name	Event Code
EVENT_COMPOSE_01	54
EVENT_COMPOSE_02	55
EVENT_COMPOSE_03	56
EVENT_COMPOSE_04	57
EVENT_COMPOSE_05	58
EVENT_COMPOSE_06	59
EVENT_COMPOSE_07	60
EVENT_COMPOSE_08	61
EVENT_COMPOSE_09	62
EVENT_COMPOSE_10	63
EVENT_COMPOSE_11	64
EVENT_COMPOSE_12	65
EVENT_COMPOSE_13	66

Event code for command number 19 (Continued)

Event Name	Event Code
EVENT_COMPOSE_14	67
EVENT_COMPOSE_15	68
EVENT_COMPOSE_16	69
EVENT_COMPOSE_17	70
EVENT_COMPOSE_18	71
EVENT_COMPOSE_19	72
EVENT_COMPOSE_20	73
EVENT_COMPOSE_21	74

Return codes for command number 19

Return Code	Description
00	OK
01	Meter run is invalid
02	CH4 is invalid
03	N2 is invalid
04	CO2 is invalid
05	C2H6 is invalid
06	C3H8 is invalid
07	H2O is invalid
08	H2S is invalid
09	H2 is invalid
10	CO is invalid
11	O2 is invalid
12	i-C4H10 is invalid
13	n-C4H10 is invalid
14	i-C5H12 is invalid
15	n-C5H12 is invalid
16	n-C6H14 is invalid
17	n-C7H16 is invalid
18	n-C8H18 run is invalid
19	n-C9H20 is invalid
20	n-C10H22 is invalid
21	HE is invalid
22	AR is invalid
23	Total exceeds 100%
100	Pass code is incorrect
Other	Invalid

Command Number 20: Read the Gas Component Parameter

Use command number 20 to read the settings of the gas components for each meter run.

Parameters for command number 20

Address	Data Type	Attribute	Description
49025	u_short	RW	20
49026	u_short	R	Return code 0: OK
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	float	R	CH4
49037	float	R	N2
49039	float	R	CO2
49041	float	R	C2H6
49043	float	R	C3H8
49045	float	R	H2O
49047	float	R	H2S
49049	float	R	H2
49051	float	R	CO
49053	float	R	O2
49055	float	R	i-C4H10
49057	float	R	n-C4H10
49059	float	R	i-C5H12
49061	float	R	n-C5H12
49063	float	R	n-C6H14
49065	float	R	n-C7H16
49067	float	R	n-C8H18
49069	float	R	n-C9H20
49071	float	R	n-C10H22
49073	float	R	HE
49075	float	R	AR

There is no event code for command number 20.

Return codes for command number 20

Return Code	Description
00	OK
01	Meter run is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 21: Reset Accumulation

Use command number 21 to clear accumulation to zero for one meter run.

Parameters for command number 21

Address	Data Type	Attribute	Description
49025	u_short	RW	21
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user

There is no event code for command number 21.

Return codes for command number 21

Return Code	Description
00	OK
01	Meter run is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 22: Get Daily History

Use command number 22 to get daily history data.

Parameters for command number 22

Address	Data Type	Attribute	Description
49025	u_short	RW	22
49026	u_short	W	Return code 0: OK
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030	u_short	W	Start date index (1…35). 1: Yesterday 2: The day before yesterday
49031	u_short	W	Number of records you want to get (1…8)
49032…49034	—	—	Reserved

Registers for record 1 of daily history data

Address	Data Type	Attribute	Description
49035	u_char[0]	R	Year (storage time)
	u_char[1]		Month (storage time)
49036	u_char[0]	R	Day (storage time)
	u_char[1]		Hour (storage time)
49037	u_char[0]	R	Minute (storage time)
	u_char[1]		Second (storage time)
49038	u_short	R	Unit of measurement 0: U.S. 1: Metric
49039	float	R	Average static pressure
49041	float	R	Average temperature
49043	float	R	Average differential pressure/average pulse
49045	float	R	Density
49047	float	R	Accumulated run time
49049	float	R	Daily base volume of flow rate
49051	float	R	Daily flowing volume of flow rate
49053	float	R	Daily mass volume of flow rate
49055	float	R	EXT (AGA3)/ Uncorrected volume (AGA7)

Registers for record 1 of daily history data (Continued)

Address	Data Type	Attribute	Description
49057	float	R	Reserved
49059	float	R	User variable 1
49061	float	R	User variable 2
49063	float	R	User variable 3
49065	float	R	User variable 4

The following table lists the register addresses for records 2…8 of daily history data. The data type and attribute of each register are the same as those of the corresponding register for record 1.

Registers for records 2…8 of daily history data

Address	Data Type	Attribute	Description
49067…49097	As above	As above	Record 2
49099…49129	As above	As above	Record 3
49131…49161	As above	As above	Record 4
49163…49193	As above	As above	Record 5
49195…49235	As above	As above	Record 6
49237…49267	As above	As above	Record 7
49269…49299	As above	As above	Record 8

There is no event code for command number 22.

Return codes for command number 22

Return Code	Description
00	OK
01	Meter run is invalid
02	Start date index is invalid
03	Number of records you want to get is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 23: Get Hourly History

Use command number 23 to get hourly history data.

Parameters for command number 23

Address	Data Type	Attribute	Description
49025	u_short	RW	23
49026	u_short	W	Return code 0: OK
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030	u_short	W	Start date index (0…35). 0: Today 1: Yesterday
49031	u_short	W	Start hour index in the day (0…23, 24…29)
49032	u_short	W	Number of records you want to get. The maximum value is 8.
49033…49034	—	—	Reserved

Registers for record 1 of hourly history data

Address	Data Type	Attribute	Description
49035	u_char[0]	R	Year (storage time)
	u_char[1]		Month (storage time)
49036	u_char[0]	R	Day (storage time)
	u_char[1]		Hour (storage time)
49037	u_char[0]	R	Minute (storage time)
	u_char[1]		Second (storage time)
49038	u_short	R	Unit of measurement 0: U.S. 1: Metric
49039	float	R	Average static pressure
49041	float	R	Average temperature
49043	float	R	Average differential pressure/average pulse
49045	float	R	Density
49047	float	R	Accumulated run time
49049	float	R	Hourly base volume of flow rate
49051	float	R	Hourly flowing volume of flow rate
49053	float	R	Hourly mass volume of flow rate

Registers for record 1 of hourly history data (Continued)

Address	Data Type	Attribute	Description
49055	float	R	EXT (AGA3)/ Uncorrected volume (AGA7)
49057	float	R	Reserved
49059	float	R	User variable 1
49061	float	R	User variable 2
49063	float	R	User variable 3
49065	float	R	User variable 4

The following table lists the register addresses for records 2…8 of hourly history data. The data type and attribute of each register are the same as those of the corresponding register for record 1

Registers for records 2…8 of hourly history data

Address	Data Type	Attribute	Description
49067…49097	As above	As above	Record 2
49099…49129	As above	As above	Record 3
49131…49161	As above	As above	Record 4
49163…49193	As above	As above	Record 5
49195…49235	As above	As above	Record 6
49237…49267	As above	As above	Record 7
49269…49299	As above	As above	Record 8

There is no event code for command number 23.

Return codes for command number 23

Return Code	Description
00	OK
01	Meter run is invalid
02	Start date index is invalid
03	Start time index is invalid
04	Number of records received
100	Pass code is incorrect
Other	Invalid

Command Number 24: Read Alarm Logs

Use command number 24 to read alarm logs for up to 15 alarms at a time. Each alarm consists of 12 registers.

Parameters for command number 24

Address	Data Type	Attribute	Description
49025	u_short	RW	24
49026	u_short	R	Return code 0: OK
49027	u_short	W	Reserved
49028	u_int	W	Pass code for user
49030	u_short	W	Start date index (0…299)
49031	u_short	W	Number of records you want to get (1…15)
49032…49034	—	—	Reserved

Registers for alarm 1

Address	Data Type	Attribute	Description
49035	u_short	R	Alarm ID
49036	u_short	R	Alarm type
49037	u_char	R	Year
	u_char	R	Month
49038	u_char	R	Day
	u_char	R	Hour
49039	u_char	R	Minute
	u_char	R	Second
49040	u_short	R	Variable address
49041	float	R	Value
49043…49046	u_short	R	Reserved[4]

The following table lists the register addresses for alarms 2…15. The data type and attribute of each register are the same as those of the corresponding register for alarm 1

Registers for alarms 2…15

Address	Data Type	Attribute	Description
49047…49058	See above	See above	Alarm 2
49059…49070	See above	See above	Alarm 3
49071…49082	See above	See above	Alarm 4

Registers for alarms 2…15 (Continued)

Address	Data Type	Attribute	Description
49083…49094	See above	See above	Alarm 5
49095…49106	See above	See above	Alarm 6
49107…49118	See above	See above	Alarm 7
49119…49130	See above	See above	Alarm 8
49131…49142	See above	See above	Alarm 9
49143…49154	See above	See above	Alarm 10
49155…49166	See above	See above	Alarm 11
49167…49178	See above	See above	Alarm 12
49179…49190	See above	See above	Alarm 13
49191…49202	See above	See above	Alarm 14
49203…49214	See above	See above	Alarm 15

There is no event code for command number 24.

Return codes for command number 24

Return Code	Description
00	OK
01	Meter run is invalid
02	Number of records you want to get is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 25: Read New Alarm Logs

Use command number 25 to read new alarm logs. The value in register 49030 indicates how many new alarm records have been loaded with this reading. The maximum number is 15. Each new alarm record consists of 12 registers and has the same format as an alarm.

Parameters for command number 25

Address	Data Type	Attribute	Description
49025	u_short	RW	25
49026	u_short	R	Return code 0: OK
49027	u_short	W	Reserved
49028	u_int	W	Pass code for user
49030	u_short	R	Number of read records

Parameters for command number 25 (Continued)

Address	Data Type	Attribute	Description
49031	u_short	R	Number of remaining new records
49032	u_short	R	Number of lost records
49033…49034	—	—	Reserved

There is no event code for command number 25.

Return codes for command number 25

Return Code	Description
00	OK
100	Pass code is incorrect
Other	Invalid

Command Number 26: Read Event Logs

Use command number 26 to read event logs for up to 20 events at a time. Each event consists of 10 registers.

Parameters for command number 26

Address	Data Type	Attribute	Description
49025	u_short	RW	26
49026	u_short	R	Return code 0: OK
49027	u_short	R	Reserved
49028	u_int	W	Pass code for user
49030	u_short	W	Event start index (0…699)
49031	u_short	W	Number of events to load in (1…20)
49032…49034	—	—	Reserved

Registers for event 1

Address	Data Type	Attribute	Description
49035	u_short	R	Event index (0…65535)
49036	u_short	R	Reserved
49037	u_char[0]	R	Year of the event date(1)
	u_char[1]	R	Month of the event date(1)

Registers for event 1 (Continued)

Address	Data Type	Attribute	Description
49038	u_char[0]	R	Day of the event date[1]
	u_char[1]	R	Hour of the event time[2]
49039	u_char[0]	R	Minute of the event time[2]
	u_char[1]	R	Second of the event time[2]
49040	u_char[0]	R	Event value (see Chapter 6, Global Event Codes for Modbus Protocols)
	u_char[1]	R	Event occurred in meter run[3]
49041	float	R	Value before event happens[4]
49043	float	R	Value after event happens[4]

(1) The Date format is "YYMMDD.0".

(2) The Time format is "HHMMSS.0".

(3) There is no meter run number for system events. The default value is 0.

(4) EVENT_POWERON(1), EVENT_POWEROFF(2), and EVENT_WATCHDOG_RESET(4) do not have these data.

The following table lists the register addresses for events 2…20. The data type and attribute of each register are the same as those of the corresponding register for event 1

Registers for events 2…20

Address	Data Type	Attribute	Description
49045…49054	See above	See above	Event 2
49055…49064	See above	See above	Event 3
49065…49074	See above	See above	Event 4
49075…49084	See above	See above	Event 5
49085…49094	See above	See above	Event 6
49095…49104	See above	See above	Event 7
49105…49114	See above	See above	Event 8
49115…49124	See above	See above	Event 9
49125…49134	See above	See above	Event 10
49135…49144	See above	See above	Event 11
49145…49154	See above	See above	Event 12
49155…49164	See above	See above	Event 13
49165…49174	See above	See above	Event 14
49175…49184	See above	See above	Event 15
49185…49194	See above	See above	Event 16

Registers for events 2…20 (Continued)

Address	Data Type	Attribute	Description
49195…49204	See above	See above	Event 17
49205…49214	See above	See above	Event 18
49215…49224	See above	See above	Event 19
49225…49234	See above	See above	Event 20

There is no event code for command number 26.

Return codes for command number 26

Return Code	Description
00	OK
01	Event start index is invalid
02	Event numbers is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 27: Read New Event Logs

Use command number 27 to read the new event records. The value in register 49030 indicates how many new event records have been loaded with this reading. The maximum number is 20. Each new event record consists of 10 registers and has the same format as an event.

Parameters for command number 27

Address	Data Type	Attribute	Description
49025	u_short	RW	27
49026	u_short	R	Return code 0: OK
49027	u_short	W	Reserved
49028	u_int	W	Pass code for user
49030	u_short	R	Number of read records
49031	u_short	R	Number of remaining new records
49032	u_short	R	Number of lost records
49033…49034	—	—	Reserved

There is no event code for command number 27.

Return codes for command number 5

Return Code	Description
00	OK
100	Pass code is incorrect
Other	Invalid

Command Number 28: Disable/Enable the Automatic Components Analysis Instrument

Use command number 28 to set whether or not to read the gas component parameters from a gas component analyzer automatically.

Parameters for command number 28

Address	Data Type	Attribute	Description
49025	u_short	RW	28
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	W	Get gas component parameters from the gas component analyzer. 0: Disable 1: Enable

There is no event code for command number 28.

Return codes for command number 28

Return Code	Description
00	OK
01	Meter run is invalid
02	Automatic components analysis instrument selection is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 29: Read the Flag of Getting Gas Component Parameters from the Gas Component Analyzer

Use command number 29 to read the flag of whether or not the gas component parameters are read from the gas component analyzer.

Parameters for command number 29

Address	Data Type	Attribute	Description
49025	u_short	RW	29
49026	u_short	R	Return code
49027	u_short	W	Meter run (0…7)
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	u_short	R	Flag of getting gas component parameters from the gas component analyzer 0: Disable 1: Enable

There is no event code for command number 29.

Return codes for command number 29

Return Code	Description
00	OK
01	Meter run is invalid
100	Pass code is incorrect
Other	Invalid

Command Number 30: Acknowledge Alarms

Use command number 30 to acknowledge all the new alarms in the alarm log. The controller will clear the flag for all the new alarms after receiving this command.

Parameters for command number 30

Address	Data Type	Attribute	Description
49025	u_short	RW	30
49026	u_short	R	Return code
49027	—	—	Reserved
49028	u_int	W	Pass code for user

Parameters for command number 30 (Continued)

Address	Data Type	Attribute	Description
49030…49034	—	—	Reserved
49035	—	—	Reserved
…	—	—	Reserved

There is no event code for command number 30.

Return codes for command number 30

Return Code	Description
00	OK
01	Pass code is incorrect
Other	Invalid

Command Number 31: Acknowledge Events

Use command number 31 to acknowledge all the new events in the event log. The controller will clear the flag for all the new events after receiving this command.

Parameters for command number 31

Address	Data Type	Attribute	Description
49025	u_short	RW	31
49026	u_short	R	Return code
49027	—	—	Reserved
49028	u_int	W	Pass code for user
49030…49034	—	—	Reserved
49035	—	—	Reserved
…	—	—	Reserved

There is no event code for command number 31.

Return codes for command number 31

Return Code	Description
00	OK
100	Pass code is incorrect
Other	Invalid

Notes:

Enron Modbus Protocol for the 1758-FLO DataSite Controller

The Modbus protocol is designed as a means to communicate control data between controllers and sensors using an RS232 port. The Enron Modbus protocol, used in the oil and gas industry, is based on the Modbus ASCII and Modbus RTU protocols.

The 1758-FLO DataSite controllers support Enron Modbus and standard Modbus protocols on the same serial port. The standard Modbus protocol and the Enron Modbus protocol use different station addresses. This feature allows the standard PC host to communicate with the 1758-FLO controller in the standard Modbus protocol and an Enron Modbus host to communicate with this controller at the same time.

The 1758-FLO DataSite controllers support the following Enron Modbus function codes.

Enron Modbus function codes and descriptions

Command	Description
3	Read multiple numeric variables
6	Write single numeric variable
16	Write multiple numeric variables

Register Addresses

The following table lists the address ranges of the Enron registers that hold short integers, long integers, and single precision floats.

Register address ranges

Range	Data Type	Description
32	Record	Event/Alarm archive (Event from 1…700, alarm from 701…1000)
701…716	Record	Hourly/Daily archive
1001…2999	Boolean	Reserved
3001…3450	Short integer	16 bits, high byte first
5001…5080	Long integer	32 bits, high byte fist, high word first. For example, if the number 2,923,517,522 sent a 32-bit unsigned integer, it would be AE 41 56 52.
7001…7800	Float	32 bits, IEEE single precision floating-point number, high byte first, high word first. For example, if the number 326,787 is sent as a 32-bit float, it would be 48 9F 90 60.

1758-FLO DataSite Variables

A 1758-FLO DataSite controller supports up to eight meter runs. Meter runs are configured individually. Gas quality is set for each meter run. The following table lists the ranges of Enron Modbus variables used by the controller.

Enron Modbus variable ranges

Purpose	Hourly/Daily Archive	Boolean	Short Integer	Long Integer	Floating Point
System variables	None	None	3000…3050	None	None
Meter run 0	701…702	None	3051…3100	5001…5010	7001…7100
Meter run 1	703…704	None	3101…3150	5011…5020	7101…7200
Meter run 2	705…706	None	3151…3200	5021…5030	7201…7300
Meter run 3	707…708	None	3201…3250	5031…5040	7301…7400
Meter run 4	709…710	None	3251…3300	5041…5050	7401…7500
Meter run 5	711…712	None	3301…3350	5051…5060	7501…7600
Meter run 6	713…714	None	3351…3400	5061…5070	7601…7700
Meter run 7	715…716	None	3401…3450	5071…5080	7701…7800

Information Variables

This section describes global variables used in the DataSite controller. These variables contain the information about the controller and can be accessed by using the Enron Modbus protocol.

Short Integer Variables

Short integer variables are accessed using commands 3, 6, and 16. These commands are similar to the corresponding standard Modbus commands, and they use Enron Modbus addressing. The size of the data fields for each variable is determined by the variable address. The read command returns two bytes for each requested register. The write command provides two bytes for each register value. Read-only (RO) registers cannot be written by using commands 6 and 16.

The following tables list all the short integer variables used by Enron Modbus in the DataSite controller. The Access column in the tables indicates the register type. Registers may be read/write (R/W) or read-only (R/O). Configuration registers are read/write registers.

Firmware and hardware version information

Register	Description	Access
3001	Firmware version high bytes (ASCII code range 0x30…0x39 and 0x3E)	RO
3002	Firmware version low bytes (ASCII code range 0x30…0x39 and 0x3E)	RO
3003	Hardware version high bytes (ASCII code range 0x30…0x39 and 0x3E)	RO
3004	Hardware version low bytes (ASCII code range 0x30…0x39 and 0x3E)	RO

Real-time clock variables

Register	Description	Access
3005	Year. Range: 0…99	R/W
3006	Month. Range: 1…12	R/W
3007	Day. Range: 1…31	R/W
3008	Hour. Range: 0…23	R/W
3009	Minute. Range: 0…59	R/W
3010	Second. Range: 0…59	R/W

ID variables for 1758-FLO controllers

Register	Description	Access
3011	Device name character 1. Range: 33…126	R/W
3012	Device name character 2. Range: 33…126	R/W
3013	Device name character 3. Range: 33…126	R/W
3014	Device name character 4. Range: 33…126	R/W
3015	Device name character 5. Range: 33…126	R/W
3016	Device name character 6. Range: 33…126	R/W
3017	Device name character 7. Range: 33…126	R/W
3018	Device name character 8. Range: 33…126	R/W
3019	Contract hour. Range: 0…23	R/W
3020	Current pointer index for event log	RO
3021	Current pointer index for alarm log	RO
3022…3050	Reserved	—

Meter Run 0

Execution state variable

Register	Description	Access
3051	Execution state Bit 0: 0 = Stop, 1 = Run. Bit 1: 0 = Disable accumulation, 1 = Enable accumulation.	R/W

IMPORTANT When setting a bit value to the register , you should protect the other bit values .

Instantaneous input variables

Register	Description	Access
3052	Calibration flags Bit 0: Differential pressure or pulse. 0 = No, 1 = Yes. Bit 1: Static pressure. 0 = No, 1 = Yes. Bit 2: Temperature. 0 = No, 1 = Yes.	RO

General input configuration variables

Register	Description	Access
3053	Input unit type. Bit 3: 0 = US, 1 = Metric	R/W
3054	Flow calculation type. 0 = AGA-3 (1992), 1 = AGA-7	R/W
3055	Compressibility calculation type 0 = Gas analysis, 1 = HR-GR-COR, 2 = GR-CO2-N2	R/W
3056	Static pressure tap location 0 = upstream, 1 = downstream	R/W
3057	Pressure type 0 = gauge, 1 = absolute	R/W
3058	Time duration for low flow pulse limit check (in seconds). Range: 0…5 s (AGA-7 only)	R/W
3059	Calculation interval	R/W

Instantaneous input register address

Register	Description	Access
3060	Temperature input register Modbus address	R/W
3061	Static pressure input register Modbus address	R/W
3062	Differential pressure input register Modbus address	R/W

AGA-3 configuration variables

Register	Description	Access
3063	Orifice material 0 = stainless, 1 = monel, 2 = carbon steel	R/W
3064	Tube material 0 = stainless, 1 = monel, 2 = carbon steel	R/W

Instantaneous input register data type

Register	Description	Access
3065	DP register data type 0 = ushort, 1 = float	R/W
3066	P register data type 0 = ushort, 1 = float	R/W
3067	T register data type 0 = ushort, 1 = float	R/W

Current pointer index for hourly and daily logs

Register	Description	Access
3068	Current pointer index for hourly log	RO
3069	Current pointer index for daily log	RO

Collecting Components Analysis Instrument Automatically

Register	Description	Access
3070	bit4: Flag for collecting components analysis instrument automatically (0 = no,1 = yes)	RW
3071	The interval for collecting components analysis instrument automatically	RW
3072-3100	Reserved	—

Long Integer Variables

Long integer variables are accessed using commands 3, 6, and 16. These commands are similar to the corresponding standard Modbus commands, and they use Enron Modbus addressing. The size of the data fields for each variable is determined by the variable address. The read command returns four bytes for each requested register. The write command provides four bytes for each register value. Read-only (RO) registers cannot be written by using commands 6 and 16.

The following table lists all the long integer variables used by Enron Modbus in the DataSite controller.

Meter Run 0 Data Variables

Accumulated flow variables

Register	Description	Access
5001	Total accumulated run time. Unit is seconds.	RO
5002	Total flow time of the previous day. Unit is seconds.	RO
5003	Total flow time of the current day. Unit is seconds.	RO
5004	Total flow time of the previous hour. Unit is seconds.	RO
5005	Total flow time of the current hour. Unit is seconds.	RO
5006	Total accumulated mass flow quantity.	RO
5007	Total accumulated flow volume at base conditions.	RO
5008	Total accumulated flow volume at flowing conditions.	RO
5009…5010	Reserved	—

Floating Point Variables

Floating point variables are accessed using commands 3, 6, and 16. These commands are similar to the corresponding standard Modbus commands, and they use Enron Modbus addressing. The size of the data fields for each variable is determined by the variable address. The read command returns four bytes for each requested register. The write command provides four bytes for each register value. Read-only (RO) registers cannot be written by using commands 6 and 16.

The following tables list all the floating point variables used by Enron Modbus in the DataSite controller.

Meter Run 0 Data Variables

Current value

Register	Description	Access
7001	Current temperature	RO
7002	Current static pressure	RO
7003	Current differential pressure (AGA-3)	RO

Instantaneous flow variables

Register	Description	Access
7004	Flow volume rate	RO
7005	Flow mass rate	RO
7006	Average EXT for the hour (AGA-3 1990 only) (EXT is the square root of the product of static pressure and differential pressure.)	RO
7007	Average uncorrected flow volume for the hour (AGA-7 only)	RO

Force variables

Register	Description	Access
7008	Forced temperature	RO
7009	Forced static pressure	RO
7010	Forced differential pressure (AGA-3 only)	RO

Compressibility variables

Register	Description	Access
5001	Total accumulated run time. Unit is seconds.	RO
5002	Total flow time of the previous day. Unit is seconds.	RO
5003	Total flow time of the current day. Unit is seconds.	RO
5004	Total flow time of the previous hour. Unit is seconds.	RO
5005	Total flow time of the current hour. Unit is seconds.	RO
5006	Total accumulated mass flow quantity.	RO

Accumulated flow variables

Register	Description	Access
7017	Flow volume at base conditions during the contract day	RO
7018	Flow mass at base conditions during the contract day	RO
7019	Reserved	—
7020	Reserved	—
7021	Mass quantity of the previous day	RO
7022	Volume quantity of the previous day in base conditions	RO
7023	Volume quantity of the previous day in flowing conditions	RO
7024…7028	Reserved	—
7029	Average differential pressure for the hour	RO
7030	Average static pressure for the hour	RO
7031	Average temperature for the hour	RO
7032	Average differential pressure for the day	RO
7033	Average static pressure for the day	RO
7034	Average temperature for the day	RO

Other variables

Register	Description	Access
7035	K factor. Range: 0.001…1000000	R/W
7036	Relative density. Range: 0.0…10.0	R/W
7037…7039	Reserved	—
7040	Expansion factor based on the absolute static pressure measured at upstream tap	RO
7041	Expansion factor based on the absolute static pressure measured at downstream tap	RO
7042	Coefficient of discharge	RO

Temperature input variables

Register	Description	Access
7043	Temperature b factor	R/W
7044	Temperature k factor	R/W

Static pressure input variables

Register	Description	Access
7045	Reserved	—
7046	Static pressure b factor	R/W
7047	Static pressure k factor	R/W

Differential input variables

Register	Description	Access
7048	Differential pressure input register Modbus address	R/W
7049	Differential pressure b factor	R/W
7050	Differential pressure k factor	R/W

Other input variables

Register	Description	Access
7051	Atmospheric pressure	R/W
7052	Base temperature	R/W
7053	Base static pressure	R/W

AGA-3 configuration variables

Register	Description	Access
7054	Orifice diameter	R/W
7055	Reference temperature for orifice measurement	R/W
7056	Tube diameter	R/W
7057	Reference temperature for pipe diameter measurement	R/W
7058	Isentropic exponent	RO
7059	Viscosity	RO
7060	Temperature dead band	R/W
7061	Static pressure dead band	R/W
7062	Differential pressure dead band	R/W
7063	Temperature high limit	R/W
7064	Temperature low limit	R/W
7065	Static pressure high limit	R/W
7066	Static pressure low limit	R/W
7067	Differential pressure high limit	R/W
7068	Differential pressure low limit	R/W

AGA-3 configuration variables (Continued)

Register	Description	Access
7069	Methane	RO
7070	Nitrogen	RO
7071	Carbon dioxide	RO
7072	Ethane	RO
7073	Propane	RO
7074	Water	RO
7075	Hydrogen sulfide	RO
7076	Hydrogen	RO
7077	Carbon monoxide	RO
7078	Oxygen	RO
7079	i-Butane	RO
7080	n-Butane	RO
7081	i-Pentane	RO
7082	n-Pentane	RO
7083	n-Hexane	RO
7084	n-Heptane	RO
7085	n-Octane	RO
7086	n-Nonae	RO
7087	n-Decane	RO
7088	Helium	RO
7089	Argon	RO
7090…7100	Reserved	—

Meter Runs 1…7 Data Variables

Data variables for meter runs 1…7 use the same structure as meter run 0 data variables. The data variables are offset from meter run 0 variables according to the following tables.

Meter run 1 data variables

Register	Data Type	Description
3101…3150	Short integer	Meter run 1 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 50.
5011…5020	Long integer	Meter run 1 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 10.
7101…7200	Float	Meter run 1 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 100.

Meter run 2 data variables

Register	Data Type	Description
3151…3200	Short integer	Meter run 2 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 100.
5021…5030	Long integer	Meter run 2 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 20.
7201…7300	Float	Meter run 2 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 200.

Meter run 3 data variables

Register	Data Type	Description
3201…3250	Short integer	Meter run 3 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 30.
5031…5040	Long integer	Meter run 3 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 60.
7301…7400	Float	Meter run 3 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 300.

Meter run 4 data variables

Register	Data Type	Description
3251…3300	Short integer	Meter run 4 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 200.
5041…5050	Long integer	Meter run 4 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 40.
7401…7500	Float	Meter run 4 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 400.

Meter run 5 data variables

Register	Data Type	Description
3301…3350	Short integer	Meter run 5 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 250.
5051…5060	Long integer	Meter run 5 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 50.
7501…7600	Float	Meter run 5 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 500.

Meter run 6 data variables

Register	Data Type	Description
3351…3400	Short integer	Meter run 6 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 300.
5061…5070	Long integer	Meter run 6 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 60.
7601…7700	Float	Meter run 6 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 600.

Meter run 7 data variables

Register	Data Type	Description
3401…3500	Short integer	Meter run 7 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 350.
5071…5080	Long integer	Meter run 7 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 70.
7701…7800	Float	Meter run 7 data variables • Identical structure to meter run 0 data variables. • Offset by a value of 700.

Hourly and Daily History

Enron Modbus hourly/daily archive registers are used to read the hourly and daily logs on the 1758-FLO DataSite controller. The records are read one at a time.

Each hourly and daily record has a fixed length with 64 float data bytes in the following format as shown in the table.

Format of hourly and daily records

Field	Size	Type	Description
Date	4	FLOAT	Log date: MMDDYY.0
Time	4	FLOAT	Log time: HHMMSS.0
P_avg	4	FLOAT	Average pressure
T_avg	4	FLOAT	Average temperature
DP_avg	4	FLOAT	Average differential pressure or meter pulses
Gr	4	FLOAT	Relative density
Flow time	4	FLOAT	Run time yesterday
Volume_B	4	FLOAT	Total volume at base conditions
Volume_F	4	FLOAT	Total volume at flowing conditions
Volume_M	4	FLOAT	Total mass
Extension	4	FLOAT	Extension or uncorrected flow volume
Q Energy	4	FLOAT	Energy
VAR1	4	FLOAT	User defined variable

Format of hourly and daily records (Continued)

Field	Size	Type	Description
VAR2	4	FLOAT	User defined variable
VAR3	4	FLOAT	User defined variable
VAR4	4	FLOAT	User defined variable

Archives are stored in the following registers.

Registers for archives

Register	Description	Access
701	Meter run 0: hourly history	RO
702	Meter run 0: daily history	RO
703	Meter run 1: hourly history	RO
704	Meter run 1: daily history	RO
705	Meter run 2: hourly history	RO
706	Meter run 2: daily history	RO
707	Meter run 3: hourly history	RO
708	Meter run 3: daily history	RO
709	Meter run 4: hourly history	RO
710	Meter run 4: daily history	RO
711	Meter run 5: hourly history	RO
712	Meter run 5: daily history	RO
713	Meter run 6: hourly history	RO
714	Meter run 6: daily history	RO
715	Meter run 7: hourly history	RO
716	Meter run 7: daily history	RO

Event and Alarm Logs

The 1758-FLO DataSite event and alarm logs can be read as the Enron Modbus event/alarm log. The format of the log is shown in the following tables. The events are saved in records 1…700 in the log, and alarms are saved in records 701…1000 in the log. For the Event Type or Event Code, see Chapter 6, Global Event Codes for Modbus Protocols.

Format of event records

Field	Size	Type	Description
Date	4	FLOAT	Log date in the format, MMDDYY.0
Time	4	FLOAT	Log time in the format, HHMMSS.0
Event serial	4	FLOAT	Serial number (0…65535)
Meter run	2	Short integer	Meter run number (0…7)
Event type	2	Short integer	Description of event type
Old value	4	FLOAT	Old value
New value	4	FLOAT	New value

Format of alarm records

Field	Size	Type	Description
Date	4	FLOAT	Log date in the format, MMDDYY.0
Time	4	FLOAT	Log time in the format, HHMMSS.0
Alarm serial	4	FLOAT	Serial number (0…65535)
Register add	2	Short integer	Modbus register address which generates the alarm
Alarm type	2	Short integer	There are four alarm types: 1: ALARM_HI_LIMIT 2: ALARM_HI_RECOVE 3: ALARM_LOW_LIMIT 4: ALARM_LOW_RECOVE
Value	4	FLOAT	New value

The following table lists the register addresses associated with the alarm parameters for each meter run.

Register addresses for alarm parameters

Run	Description	Variable	Register
0	Differential pressure alarm	DP	31301
	Average static pressure alarm	P	31302
	Average temperature alarm	T	31303
1	Differential pressure alarm	DP	31304
	Average static pressure alarm	P	31305
	Average temperature alarm	T	31306
2	Differential pressure alarm	DP	31307
	Average static pressure alarm	P	31308
	Average temperature alarm	T	31309
3	Differential pressure alarm	DP	31310
	Average static pressure alarm	P	31311
	Average temperature alarm	T	31312
4	Differential pressure alarm	DP	31313
	Average static pressure alarm	P	31314
	Average temperature alarm	T	31315
5	Differential pressure alarm	DP	31316
	Average static pressure alarm	P	31317
	Average temperature alarm	T	31318
6	Differential pressure alarm	DP	31319
	Average static pressure alarm	P	31320
	Average temperature alarm	T	31321
7	Differential pressure alarm	DP	31322
	Average static pressure alarm	P	31323
	Average temperature alarm	T	31324

Notes:

Global Event Codes for Modbus Protocols

Global Event Codes

The following table lists the codes for global events. They are not specific to meter runs and are common to the controller.

Codes for system events

Code	System Event
1	Power on
2	Power off
3	Contract time changed
4	Watchdog reset
5	Set date or time
6…10	Reserved

Codes for parameter modification events

Code	Parameter Modification Event
11	Enable meter run
12	Disable meter run
13	Unit changed
14	Start to accumulate
15	Stop to accumulate
16	Enable or disable the automatic component analysis instrument
17	AGA calculation type modified
18	Method selected for the calculation of the compressibility factor modified
19	Calculation interval modified
20	BMP (base multiplier period) modified
21	Contract standard reference ratio pressure modified
22	Contract standard reference ratio temperature modified
23	Cut-off differential/Cut-off pulse modified
24	Pressure type modified
25	Atmospheric pressure modified
26	Tap location modified
27	Orifice material modified
28	Orifice diameter modified
29	Orifice reference temperature modified

Codes for parameter modification events (Continued)

Code	Parameter Modification Event
30	Tube material modified
31	Tube diameter modified
32	Tube reference temperature modified
33	Relative density type modified
34	Relative density modified
35	Reference pressure for measuring relative density modified
36	Reference temperature for measuring relative density modified
37	Gas heating value modified
38	Reference temperature for gas heating value modified
39	Register address of pressure modified
40	Pressure data type modified
41	Pressure K factor modified
42	Pressure B factor modified
43	Register address of temperature modified
44	Temperature data type modified
45	Temperature K factor modified
46	Temperature B factor modified
47	Register address of differential pressure modified
48	Differential pressure data type modified
49	Differential pressure K factor modified
50	Differential pressure B factor modified
51	Register address of pulse modified
52	Pulse data type modified
53	Pulse K factor modified
54	CH4 component level modified
55	N2 component level modified
56	CO2 component level modified
57	C2H6 component level modified
58	C3H8 component level modified
59	H20 component level modified
60	H2S component level modified
61	H2 component level modified
62	CO component level modified
63	O2 component level modified
64	iC4H10 component level modified
65	nC4H10 component level modified

Codes for parameter modification events (Continued)

Code	Parameter Modification Event
66	iC5H12 component level modified
67	nC5H12 component level modified
68	nC6H14 component level modified
69	nC7H16 component level modified
70	nC8H18 component level modified
71	nC9H20 component level modified
72	nC10H22 component level modified
73	HE component level modified
74	AR component level modified
75	Cut-off pulse modified
76	Interval for collecting components analysis instrument
Others	Reserved

Notes:

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products.
At http://www.rockwellautomation.com/support/, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html, or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

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